



Presented to
The Library
of the
University of Toronto
by

Academy of Medicine

CONTRIBUTORS TO VOLUME II

1910

CLARK, JOHN G., M.D.

COLEY, WILLIAM B., M.D.

FOOTE, EDWARD MILTON, A.M., M.D.

JACKSON, EDWARD, M.D.

STENGEL, ALFRED, M.D.

PUBLISHED QUARTERLY

BY

LEA & FEBIGER

708 Sansom Street

PHILADELPHIA

Med.
P
Awarded Grand Prize, Paris Exposition, 1900

PROGRESSIVE MEDICINE

A QUARTERLY DIGEST OF ADVANCES, DISCOVERIES
AND IMPROVEMENTS

IN THE

MEDICAL AND SURGICAL SCIENCES

EDITED BY

HOBART AMORY HARE, M.D.

PROFESSOR OF THERAPEUTICS AND MATERIA MEDICA IN THE JEFFERSON MEDICAL COLLEGE OF PHILADELPHIA; PHYSICIAN TO THE JEFFERSON MEDICAL COLLEGE HOSPITAL; ONE TIME CLINICAL PROFESSOR OF DISEASES OF CHILDREN IN THE UNIVERSITY OF PENNSYLVANIA;
MEMBER OF THE ASSOCIATION OF AMERICAN PHYSICIANS, ETC.

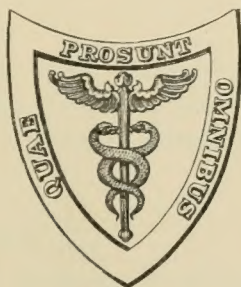
ASSISTED BY

LEIGHTON F. APPLEMAN, M.D.

INSTRUCTOR IN THERAPEUTICS, JEFFERSON MEDICAL COLLEGE, PHILADELPHIA; OPHTHALMOLOGIST TO THE FREDERICK DOUGLASS MEMORIAL HOSPITAL; INSTRUCTOR IN OPHTHALMOLOGY, PHILADELPHIA POLYCLINIC HOSPITAL AND COLLEGE FOR GRADUATES IN MEDICINE.

VOLUME II. JUNE, 1910

HERNIA—SURGERY OF THE ABDOMEN, EXCLUSIVE OF HERNIA—GYNECOLOGY
—DISEASES OF THE BLOOD. DIATHETIC AND METABOLIC DISEASES.
DISEASES OF THE SPLEEN, THYROID GLAND, NUTRITION, AND
THE LYMPHATIC SYSTEM—OPHTHALMOLOGY.



247748
22.10.30

LEA & FEBIGER

PHILADELPHIA AND NEW YORK

1910



Entered according to the Act of Congress, in the year 1910, by
LEA & FEBIGER,
in the Office of the Librarian of Congress. All rights reserved.

LIST OF CONTRIBUTORS.

WILLIAM T. BELFIELD, M.D.,

Professor of Genito-urinary Surgery in Rush Medical College; Professor of Genito-urinary and Venereal Diseases in the Chicago Polyclinic, Chicago.

JOSEPH C. BLOODGOOD, M.D.,

Associate Professor of Surgery, Johns Hopkins University, Baltimore, Md.

JOHN ROSE BRADFORD, M.D., F.R.C.P., F.R.S.,

Professor of Medicine in University College and Physician to the University College Hospital, London.

JOHN G. CLARK, M.D.,

Professor of Gynecology in the University of Pennsylvania, Philadelphia.

WILLIAM B. COLEY, M.D.,

Attending Surgeon to the General Memorial Hospital; Associate Surgeon to the Hospital for Ruptured and Crippled; Clinical Lecturer in Surgery and Instructor in Surgery at the College of Physicians and Surgeons, Columbia University, New York.

FLOYD M. CRANDALL, M.D.,

Consulting Physician to the Infants' and Children's Hospital; Late Visiting Physician to Minturn Hospital, New York.

EDWARD P. DAVIS, M.D.,

Professor of Obstetrics in the Jefferson Medical College of Philadelphia.

ARTHUR B. DUEL, M.D.,

Professor of Otology, New York Polyclinic Medical School and Hospital; Surgeon to the Manhattan Eye, Ear, and Throat Hospital; Consulting Aural Surgeon to the New York Health Board Hospitals; Otologist to the Babies' Hospital.

WILLIAM EWART, M.D., F.R.C.P.,

Consulting Physician to St. George's Hospital; Senior Physician to the Belgrave Hospital for Children, London.

EDWARD MILTON FOOTE, A.M., M.D.,

Visiting Surgeon, New York City Hospital and St. Joseph's Hospital; Instructor in Surgery, College of Physicians and Surgeons, Columbia University; Adjunct Professor of Surgery, New York Polyclinic Medical School and Hospital.

CHARLES H. FRAZIER, M.D.,

Professor of Clinical Surgery in the University of Pennsylvania; Surgeon to the University, Howard, and Philadelphia Hospitals.

WILLIAM S. GOTTHEIL, M.D.,

Adjunct Professor of Dermatology, New York Post-Graduate Medical School; Consulting Dermatologist to Beth Israel and Washington Heights Hospitals; Visiting Dermatologist to the City and Lebanon Hospitals, New York City.

EDWARD JACKSON, M.D.,

Professor of Ophthalmology in the University of Colorado; Ophthalmologist to the City and County Hospital of Denver.

D. BRADEN KYLE, M.D.,

Professor of Laryngology in the Jefferson Medical College, Philadelphia.

H. R. M. LANDIS, M.D.,

Visiting Physician to the White Haven Sanatorium and to the Phipps Institute; Chief of the Out-patient Medical Department of the Jefferson Medical College Hospital; Demonstrator of Clinical Medicine in the Jefferson Medical College.

RALPH LAVENSON, M.D.,

Silver City, New Mexico.

JOHN RUHRÄH, M.D.,

Professor of Diseases of Children and Therapeutics, College of Physicians and Surgeons; Visiting Physician, Robert Garrett Hospital, Nursery and Child's Hospital, Mercy Hospital; Consulting Physician, Church Home and Infirmary, Baltimore.

WILLIAM G. SPILLER, M.D.,

Professor of Neuropathology and Associate Professor of Neurology in the University of Pennsylvania; Clinical Professor of Nervous Diseases in the Woman's Medical College of Pennsylvania and in the Philadelphia Polyclinic.

ALFRED STENGEL, M.D.,

Professor of Clinical Medicine in the University of Pennsylvania, Philadelphia.

CONTENTS OF VOLUME II

HERNIA	17
By WILLIAM B. COLEY, M.D.	
SURGERY OF THE ABDOMEN, EXCLUSIVE OF HERNIA . . .	73
By EDWARD MILTON FOOTE, M.D.	
GYNECOLOGY	147
By JOHN G. CLARK, M.D.	
DISEASES OF THE BLOOD. DIATHETIC AND METABOLIC DISEASES. DISEASES OF THE THYROID GLAND, NUTRITION, AND THE LYMPHATIC SYSTEM. . . .	231
By ALFRED STENGEL, M.D.	
OPHTHALMOLOGY	327
By EDWARD JACKSON, M.D.	
INDEX	355

PROGRESSIVE MEDICINE.

JUNE, 1910.

HERNIA.

By WILLIAM B. COLEY, M.D.

Traumatic Hernia, or "Hernia Accident." The importance of determining just to what extent injury is a factor in the causation of hernia, is becoming more clearly recognized each year. This question has recently been studied from a medico-legal standpoint by William Sheen,¹ who states as follows:

"Excessive strain must be regarded as an injury," epitomizes a judgment of the House of Lords, the highest legal tribunal in England, and it is to "excessive strain," generally from lifting, that a workman commonly attributes his hernia, or "rupture," as it is, as a rule, wrongly and most unwisely termed. Now, no one doubts that a working life, which day after day exhibits "excessive strains," is a life which contributes to the production of hernia, but this is not sufficient to constitute hernia as an accident within the meaning of a "Compensation Act." I shall limit myself to considering when, if ever, the surgeon is justified in supporting the view of the workman, that the hernia from which the latter suffers is due to a single "strain."

Sheen cites the ordinary case of supposed traumatic hernia in which claim for damages is brought against an employer or corporation. The claimant will say: "On such and such a date, at such and such a time, I lifted an unusually heavy weight, and felt a sensation of something giving way in my right groin. My fellow-workman was with me at the time, and I mentioned the matter to him. I finished my day's work. That same evening when washing, I found a lump in my right groin. Next morning I went to the doctor." Of course, variations of this history will occur. Nothing may be felt locally at the time of the supposed strain. It may be days, or weeks, after the strain before the workman discovers the hernia. The hernia, when found, may

¹ Practitioner, London, 1909, vol. lxxxiii, p. 334.

be large or small. The hernia may be attributed not to a strain, but to a blow in the groin, abdomen, or elsewhere, or to some other cause. The presence of a double hernia is sometimes attributed to a single strain. He believes that such associations of strain and hernia as cause and effect are fallacious, although he does not think that the working-man, as a rule, intends to practise deception, but he is influenced (1) by a desire to find a cause for the trouble; (2) by the common use of the word "rupture" instead of hernia, which produces in the mind the idea that the condition is one due to violence or injury. Sheen believes that the sudden first appearance of a hernia, in the sense that it constitutes an accident arising from excessive strain, is very rare, but not an impossible event. He states: "I consider that its sudden complete development, in a pathological sense, is impossible, because the peritoneum cannot stretch suddenly to form the sac. The peritoneum is incapable of sudden, but is capable of very great gradual, extension; it is only the sudden clinical development of a hernia which is possible, and what happens is the sudden projection of a small amount of contents into an unobliterated funicular process, the process being of such size and laxity as to be able at once to constitute a definite sac. The cause of this is most likely to be straining in an unnatural attitude—ordinary straining efforts close the inguinal rings. Localized blows cannot cause a hernia.

"The sudden projection of hernial contents into the preformed sac is accompanied by definite immediate symptoms. The affected individual suffers acute pain at the site of the hernia, at once undoes his clothes, finds a small lump there, is faint, has nausea or sickness, ceases work at once, and has to be helped or carried home. The hernia is reducible with difficulty only, if at all, and is often strangulated. A medical man is at once consulted.

"Must not the above be so? Parts unaccustomed to it are stretched. Parts, some of which (particularly the subperitoneal connective tissue) are known to be highly sensitive and well supplied with nerves. The highly sensitive mesentery of the bowel is dragged and nipped in a tight fascial embrace. The vascular supply of the bowel and the passage of its contents may be interfered with. Acute pain, tenderness, nausea, sickness, faintness, and general distress are natural sequences. Then the true traumatic hernia must be small at first; the sac is almost always small, and even imagining a large lax sac, the other parts would permit only of a limited sudden extension, and also the normal mesentery is not long enough to permit descent of contents far below the normal level."

Sheen believes the sudden first appearance of a scrotal hernia to be impossible. He considers it highly probable that in all these sudden "first appearances" of hernia, the individuals really had herniæ in infancy, the contents of which disappeared during the process of growth,

such a condition more readily permitting a second entry which may be sudden.

In this latter statement I do not entirely agree with Sheen, although I do believe that in practically all cases of inguinal hernia, except the direct, there is an open funicular pouch or process of peritoneum present at birth. In many cases, this may not ever have had any contents in infancy, and, therefore, nothing more than a potential hernia was present, but later, through some extraordinary effort, something may be forced into this open pouch. These cases of sudden appearance of a hernia are extremely rare; only two or three such instances having been observed at the Hospital for Ruptured and Crippled in a series of 1000 cases.

Tillman goes so far as to say that "the supposed sudden development of a true hernia is, in my opinion, always due to a mistake in observation."

Sheen made inquiries regarding the relation of hernia to injury among his countrymen, and received seventy replies, which he summarizes as follows:

Oblique inguinal hernia may develop suddenly. Such an event is uncommon, and results from a "strain" of the nature of a lifting effort. The sac of an ordinary oblique inguinal hernia is congenital, although opinions differ much on this point. A scrotal hernia cannot develop suddenly. A sudden hernia is quite small at first. If the hernial sac is an "acquired" sac, the contents cannot appear suddenly as the result of a "strain." Symptoms would accompany the sudden first appearance of a hernia, viz., pain, tenderness, tumor, inability to continue work, and other symptoms. It could not occur unnoticed by the person affected. Similar symptoms would occur if the hernia were present before, and were suddenly increased in size as a result of the strain.

In conclusion, Sheen very aptly says:

"A hernia may be felt for the first time during a straining effort, and this is very likely to occur in the working classes who are constantly straining. This, however, is the occasion leading to the discovery of the hernia; it is not its cause."

I have already discussed this question of the relation of injury to hernia rather fully in a previous number of *PROGRESSIVE MEDICINE*.

Since that time I have had an analysis made of 5000 additional cases, and this fully supports my former conclusion.

Intestinal Resection in Strangulated Hernia. The question of intestinal resections in strangulated hernia has been ably discussed by Delore and Thévenet,¹ of Lyon, France.

They state, at the outset, that if the more recent works upon hernia

¹ *Revue de Chirurgie*, 1909, No. 6, p. 1153.

are consulted, it is surprising to find the lack of agreement among surgeons as to the proper course to pursue in strangulated hernia in which the loop of bowel is more or less doubtful. They themselves believe that, thanks to the perfection of the technique of abdominal surgery, in the presence of a strangulated bowel of doubtful aspect, the surgeon should adopt the more radical method of resection. They believe that, in such cases, resection is the rational treatment, and the only one that is likely to prevent the local and infectious complications which render the operative prognosis of strangulated hernia so gloomy.

Their somewhat radical views are based upon a very extensive operative experience, covering 166 personal cases of strangulated inguinal and femoral hernia. They believe that the pathological anatomy of strangulated hernia supports their view, and state that Cornil and Tschistowich and Bosc and Blanc have shown that strangulated hernia begins as an enormous blood stasis, involving the entire thickness of the intestinal wall. The mucosa becomes desquamated and infiltrated with leukocytes; the glands become friable and necrotic; the peritoneal coat loses its polished aspect and becomes covered with a false membrane. In brief, all the tunics are altered more or less by lesions characterized essentially by necrosis and hemorrhage. The extent and gravity of these lesions are shown in paralysis of the loop of intestine, and persistence of strangulation and intestinal hemorrhage.

To replace such a loop of bowel, even though an immediate cure may result from the operation, not infrequently may give rise to a slow intestinal occlusion from the cicatrices of the intestinal wall, or by adhesions, to say nothing of attacks of acute intestinal obstruction due to the formation of bands. They state that toxemia, of intestinal origin, explains a number of general symptoms which are the cause of a certain number of the delayed deaths following the reduction of a strangulated loop.

They state that in addition to the pulmonary complications which so frequently occur, as also strongly emphasized by Roux, renal complications are very often observed, most of the patients showing considerable albuminuria persisting for several days.

All these complications they believe to be due to an infection originating in the strangulated loop of bowel. Hence, the ideal therapeutic measure would be to avoid this infection by primary excision of the offending loop.

The results, in their series of cases of strangulation, support their position: Of 101 strangulated crural herniæ, 85 were cured, 16 died; of 65 inguinal herniæ, 53 were cured, 12 died. Thus, in a total of 166 cases of strangulated inguinal and crural hernia, there were 28 deaths, or a general mortality of 16.8 per cent. Of these 166 herniæ, 137 were operated upon without resection, 29 with resection; and, strange to say, the mortality of the 137 cases operated upon without

resection was 24, or 17.5 per cent., while in the 29 cases treated by resection, there were only 4 deaths, or a mortality of 13.8 per cent.

That the writers did not abuse intestinal resection, by practising it in cases in which there was no indication, in order to obtain very favorable results, is shown by the fact that resection was done in only 29 of the 166 cases. That in strangulated herniæ treated by simple reduction the mortality was 17.5 per cent., while in the cases treated by resection it was but 13.8 per cent., is an observation that requires some explanation.

To my own knowledge, no such favorable statistics have ever been obtained, and these successes are attributed by the authors to the following:

1. To the most rigid operative technique.
2. To the application of the principle, if possible, to always operate upon sound tissue. They believe that many of the failures, in previous intestinal resections in strangulated hernia, have been due to the fact that surgeons generally make such resections too limited.
3. To the fact that in cases of doubt they think it better to resect the suspicious intestinal coil, since it is always difficult to accurately estimate its vitality, as has been shown by six of their own cases in which they practised simple reduction of the coil which had every appearance of being intact, but in which death followed in every instance as a result of intestinal gangrene and peritonitis.
4. Resection of the intestinal coil prevents the later occurrence of intestinal stenosis, adhesions, strangulation by bands, etc., which are by no means infrequent when a doubtful loop is replaced.

I must say that I am in thorough accord with the position taken by Delore and Thévenet, and my own experience is in harmony with theirs.

Within the last year I have seen one death, in the hands of one of my colleagues, from replacing a doubtful loop of intestine in a case of strangulated hernia. The patient lived between two and three weeks, and then died of intestinal paresis and infection.

In another case, which I reported¹ before the meeting of the American Surgical Association, June 4, 1909, the patient's life was saved by timely operation:

Mr. Y., aged fifty-three years, has always been in good health. Operated upon for strangulated hernia by Dr. Foy, of Yonkers, in January, 1909; duration of the strangulation, eight hours. A large loop of small intestine was found very dark in color, but as it partially recovered under hot towels, it was replaced in the abdomen. The patient did very well until three weeks after operation, when he had a slight attack of intestinal obstruction. He had five or six attacks since, sometimes every five or six days; he went one month without

¹ *Annals of Surgery*, July, 1909.

any attack; the last very severe attack occurred on May 8. These attacks always began by a localized distention on the left side, which gradually spread upward across the abdomen to the right iliac fossa. Vomiting quickly followed and persisted, becoming almost fecal in character. I saw the patient on May 10; he had a movement of the bowels due to strong purgatives and enemas. The abdomen returned to normal and nothing could be felt upon palpation. The patient was somewhat weak from the effects of the attack. I believed the condition to be one of adhesions, with constriction of the bowel and areas of sloughing. I advised an operation at as early a date as possible. The patient entered the hospital on May 12, 1909, and I did a median laparotomy, assisted by Dr. W. E. Downes. I quickly found two separate loops of bowel joined at a sharp angle by a firm band of adhesions about 1 inch in diameter. These adhesions were cut, and the raw surfaces turned in with silk suture. I then came upon a mass, about the size of two fists, situated in the middle and a little to the right side of the abdomen; it consisted of five or six coils of small intestine so completely welded together that it was difficult in places to make out the outlines of the separate loops of intestine. It was evident that it would be impossible to separate these adhesions and I decided to resect the entire mass and do a lateral anastomosis. A piece of tape was passed through the mesentery and tied around the healthy portion of the bowel, well beyond the point to be divided. The mesentery was clamped off and sutured by means of fine chromicized catgut. The divided ends of the bowel were inverted and sutured in two layers. The portion removed extended nearly to the ileocecal valve. A lateral anastomosis was made between the ileum and ascending colon by means of a large Murphy button. Inasmuch as the appendix was found to contain a large, very hard concretion, and showed some evidence of congestion, it was removed. The abdominal wound was closed without drainage. Time of operation, one hour and fifteen minutes.

The first two days the patient was given a very small quantity of saline per rectum, and a small quantity of water by mouth. On the third day, he was given chicken broth and albumin water in one-half ounce portions every two hours. The amount of nourishment was gradually increased, and at the end of the week he was given solid food. He had very little more reaction than follows an ordinary hernia operation. He passed the button on the eleventh day and was up and about the ward at the end of two weeks. The wound healed by primary union.

The condition of the intestine shows that at the time of reduction the bowel must have been reduced *en masse*; the adjacent loops were so much inflamed that they immediately became adherent and finally welded together in the solid mass seen by the mounted specimen presented.

The subsequent history of this case is interesting. He had persistent

diarrhea a few weeks after operation, which continued for several months. This gradually subsided, and he is now in good health, nearly a year after the operation, although he cannot eat meat.

Primary intestinal resection in all cases in which there is any doubt as to the viability of the bowel, I believe, should be adopted as a general rule, although there should always be this exception: It should never be undertaken except under favorable conditions. The surgeon should be a man whose experience in abdominal work has been large. He should have skilled assistants to carry out, without delay, an aseptic operation.

Inguinal Hernia in the Female. In the *Annals of Surgery*, September, 1909, I discussed the subject of inguinal hernia in the female. I pointed out the fact that this type of hernia constitutes a fairly large percentage of inguinal herniæ.

At the Hospital for Ruptured and Crippled, in the last twenty years, we have had 59,404 cases of inguinal hernia, of which, 9082 were in the female. I made an analysis of 1692 cases with reference to the age of the patients at the time the hernia was first noticed. I found that in 66 of 1085 adult cases, the hernia had existed in infancy or early childhood.

TABLE I.—AGE OF PATIENTS AT TIME OF FIRST VISIT TO THE HOSPITAL.

	Single.	Double.	Total.
Up to 1 year of age	140	24	164
1 to 5 years of age	171	21	192
5 to 10 years of age	150	32	182
10 to 14 years of age	56	4	60
15 to 21 years of age	83	11	94
21 to 31 years of age	164	30	194
31 to 41 years of age	254	57	311
41 to 51 years of age	177	54	231
Over 51 years of age	185	70	255
Age not stated	6	3	9
	1386	306	1692

TABLE II.—CASES KNOWN TO HAVE HAD A HERNIA AT 14 YEARS OF AGE.

	Per cent.
34 of 94 between 15 and 21 years of age	36.1
19 of 194 between 21 and 31 years of age	9.8
8 of 311 between 31 and 41 years of age	2.5
2 of 231 between 41 and 51 years of age	0.8
3 of 255 over 51 years of age	1.2
66 of 1085 cases	6.0

ANATOMICAL VARIETIES—INDIRECT OR OBLIQUE HERNIA, AND DIRECT HERNIA. Some writers state that direct hernia in the female is even more frequent than in the male. Our observations at the Hospital for Ruptured and Crippled are entirely at variance with this

view. In making an estimate of the relative frequency of the two varieties, one can consider only such cases as have been subjected to an operation, inasmuch as a positive diagnosis cannot be made without operation. Yet the writers who believe that direct hernia in the female is comparatively frequent base their opinion upon a clinical diagnosis alone, unconfirmed by operation.

I have personally operated upon 353 cases of inguinal hernia in the female, of which, 170 were adults and 183 children, and only 2 in this entire series were direct herniæ. Both of these cases occurred in adults; one was operated upon six weeks ago, a double inguinal hernia with the bladder in the sac on the right side. This gives a proportion of

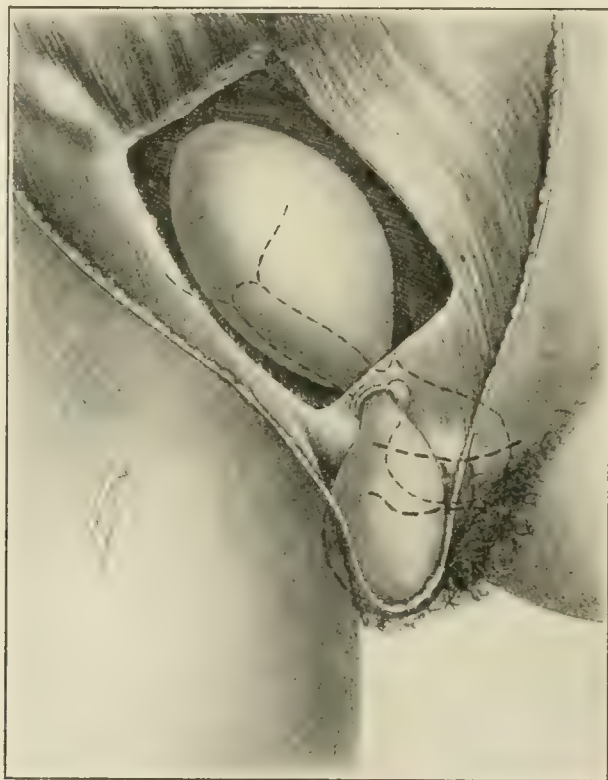


FIG. 1.—Multiple cysts of canal of Nuck.

0.6 per cent., or, if we count the adults alone, as there are practically no direct herniæ in children, it is 1.2 per cent. Comparing this with the cases of direct hernia in the male, I have operated upon 1776 cases of inguinal hernia in the male, of which, 815 were adults, 961 children. Of these, I have observed 50 cases of direct inguinal hernia, or about 3 per cent. If we consider adults alone, which is the only correct way, we have 5.5 per cent. in the male and 1.2 per cent. in the female, which would make direct hernia in the male occur five times more commonly than in the female.

Etiology. I believe that inguinal hernia in the female, or, at least, all cases of oblique inguinal hernia in the female, are due to a persistence of the process of peritoneum known as the canal of Nuck, which corre-

sponds almost exactly with the vaginal process of peritoneum in the male. That this process remains patent in many children long after birth, even into adult life, has been proved by a large number of investigators.

Unusual Cases of Inguinal Hernia in the Female. Inguinal hernia of tube and ovary, 1 case, aged twelve years; 1 case, aged six years; 1 case, aged three years; 1 case, aged forty-eight years. Strangulated hernia of appendix with large amount of exudate, 1 case, aged thirty-five years (Fig. 2). Double direct hernia with the bladder on the right side, 1 case, aged fifty-five years.

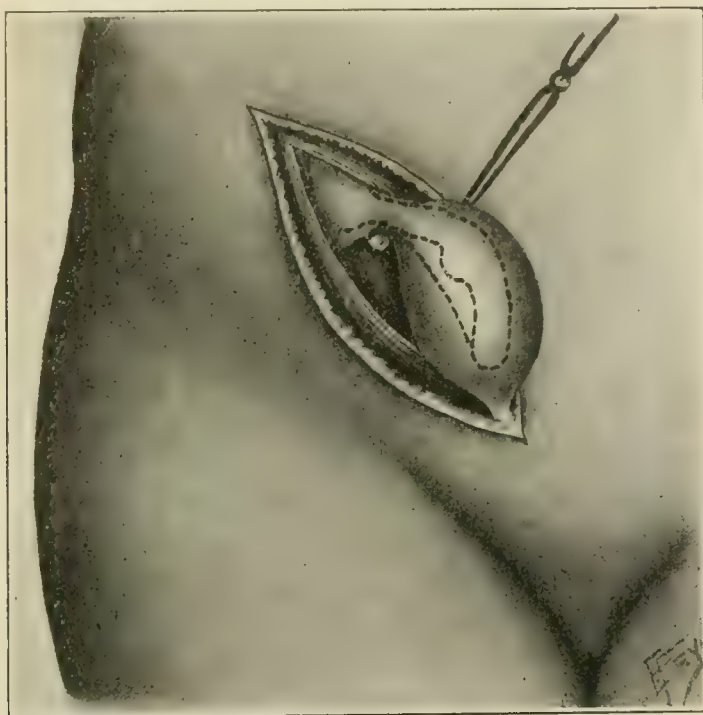


FIG. 2.—Incarcerated hernia of the appendix with sac distended with bloody fluid.

Interstitial Hernia (Case I).—*Strangulated interstitial hernia the size of a cocoanut, containing cecum and ascending colon.* This case is so extremely rare that it merits a detailed report.

Mrs. S., aged forty years, was admitted to the Hospital for Ruptured and Crippled in the afternoon of May 11, 1908, and operated upon immediately. She gave no history of ever having had a hernia, but three days before began to have pain and discomfort in the right lower abdomen, accompanied by almost complete obstipation, some nausea. The symptoms gradually became more severe. The nausea increased and was followed by slight vomiting. Before she was admitted to the hospital she had been examined by the house surgeon, who found a tumor in the right lower abdomen which was tender upon pressure and irreducible. I saw her about an hour after admission; the pulse was 120, temperature 99.5°. While her general condition could not be

called good, she did not show very marked prostration. She was fairly stout, with considerable adipose tissue in her abdominal wall.

Physical examination showed practically nothing abnormal upon inspection. Upon palpation, a tumor the size of a grape fruit or two fists could be made out in the right iliac region, extending up nearly to the level of the umbilicus and downward as far as the inguinal region. There was, however, no tumor either in the inguinal or femoral canals. Upon coughing, a protrusion could be felt apparently coming through the internal ring and extending partly into the inguinal canal. The

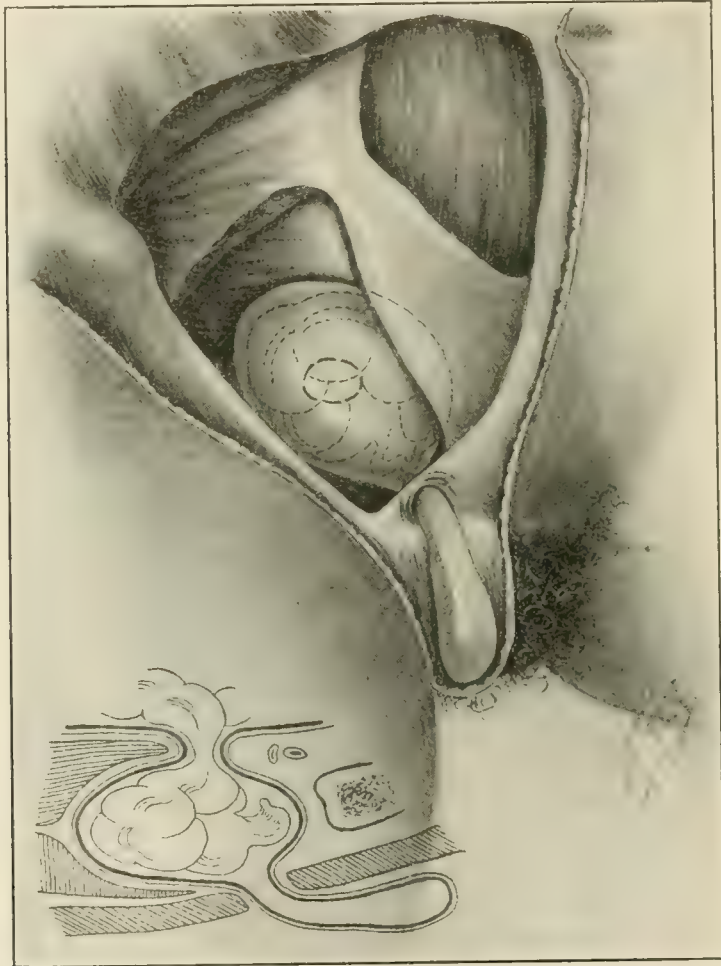


FIG. 3.—Strangulated interstitial hernia in the female.

whole tumor seemed to be situated beneath the external oblique aponeurosis; it was tympanitic upon percussion, resilient upon palpation, symmetrical in outline, and quite irreducible. I made a diagnosis of strangulated interstitial hernia, from the anatomical position of the tumor, and believed the contents of the hernial sac to be cecum, for, had the small intestine been strangulated for such a length of time, the symptoms would have been much more acute.

A long, oblique incision was made over the tumor. Upon cutting through the skin and superficial fascia, I came down upon a greatly distended external oblique aponeurosis, which was then incised. It

disclosed a very large hernial sac which, on the outer side, lay beneath the external oblique aponeurosis, and on the inner side was situated partly under the external and partly under both the external and internal oblique and the transversalis fascia beneath, making it practically a properitoneal hernia. This sac was found to contain several ounces of slightly cloudy exudate, the whole cecum and part of the ascending colon, which were dark colored but with no areas of necrosis. Under hot towels circulation became sufficiently good to warrant their return into the abdomen. The patient made an uneventful recovery.

The strangulation was evidently caused by a strong fascial ring, apparently the internal ring, and the intestine, after emerging from the internal ring, extended upward instead of downward until it had occupied the position already described (Figs. 3 and 5).

It seems to me the most probable explanation of the development of this hernia is to regard the sac as a diverticulum of congenital origin.

There is another explanation which I formerly held to be the true one, *i. e.*, to regard the sac as an acquired sac, which had gradually taken the position found at operation because it had met with some obstruction in its downward course, and it simply followed the line of least resistance. This was the view held by Macready.

Interstitial Hernia in the Female is an extremely rare occurrence, and very few cases have thus far been reported. The first in this country was, I believe, the one reported by Dr. Bull and myself, in the *New York Medical Journal*, in 1890. In this case the hernia was associated with a large hydrocele of the canal of Nuck, which we at that time regarded as furnishing the mechanical obstruction which caused the hernial sac to proceed upward beneath the aponeurosis of the external oblique (Fig. 4).

CASE II.—*Properitoneal Hernia in the Female*. A. M., aged forty-nine years, with a history of having had more or less discomfort in the right iliac region for a number of years, but had never worn a truss. In the middle of February, 1909, she came to the Hospital for Ruptured and Crippled with a swelling about the size of a goose egg or small orange in right iliac and upper inguinal region. The swelling had appeared suddenly ten hours previous to her coming to the hospital, and was accompanied by a good deal of colicky pain, but no vomiting. The swelling was reduced by the house officer without an anesthetic and the patient returned home. Two weeks later she was admitted to the Hospital for Ruptured and Crippled under the diagnosis of inguinal hernia, although one of the surgeons who saw her in the outpatient department regarded it as femoral hernia. The hernia was not down at the time of examination.

I operated upon the patient March 5, 1909, at the Hospital for Ruptured and Crippled. The usual Bassini incision was made over the inguinal canal; but, upon cutting down, I could find no enlargement

of the external ring; in fact, I could hardly find an opening sufficiently large to introduce a director. This fact, together with the discovery

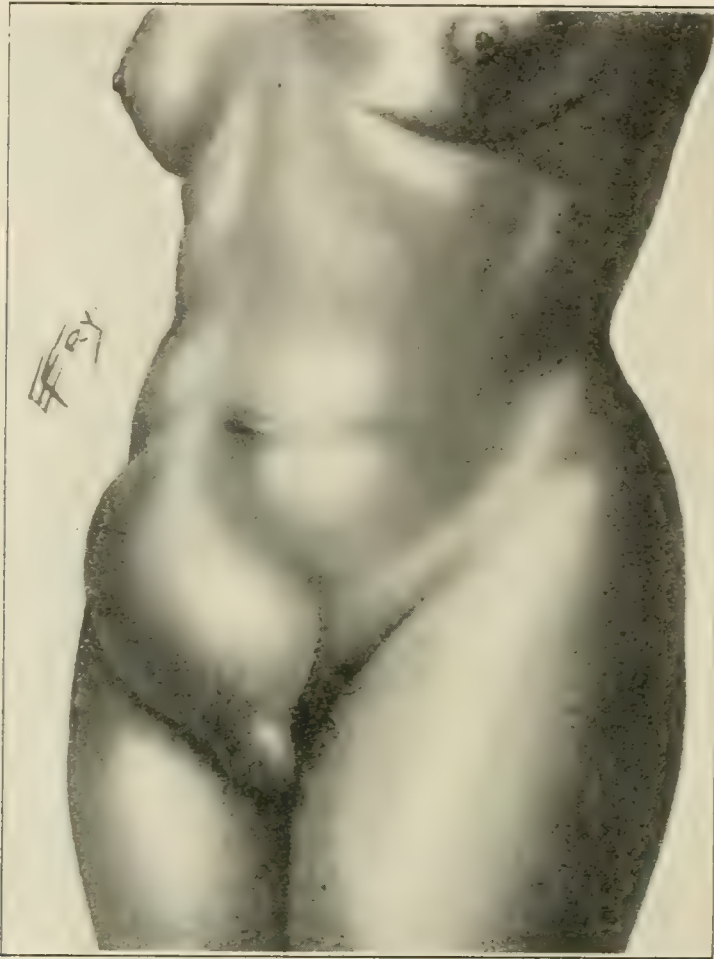


FIG. 4.—Interstitial hernia in the female, associated with hydrocele in the canal of Nuck. (Bull and Coley).

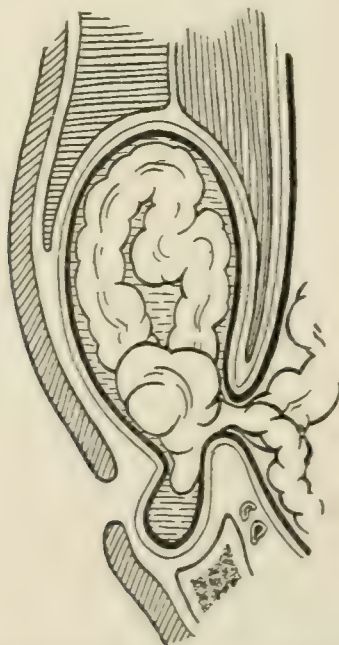


FIG. 5.—Interstitial hernia in the female. (Coley.)

of a mass of fat the size of an English walnut in the femoral region, made me suspect an error in diagnosis and to think that we had really to deal with a femoral rather than an inguinal hernia. However, careful dissection of the mass of fat failed to disclose any sac whatever in the femoral canal. I thereupon opened the aponeurosis of the external oblique over the inguinal canal nearly to the level of the anterior superior spine and downward through the external ring, which was not at all enlarged. Directly under the aponeurosis at the lower point, near the external ring, I found what proved to be a large hernial sac

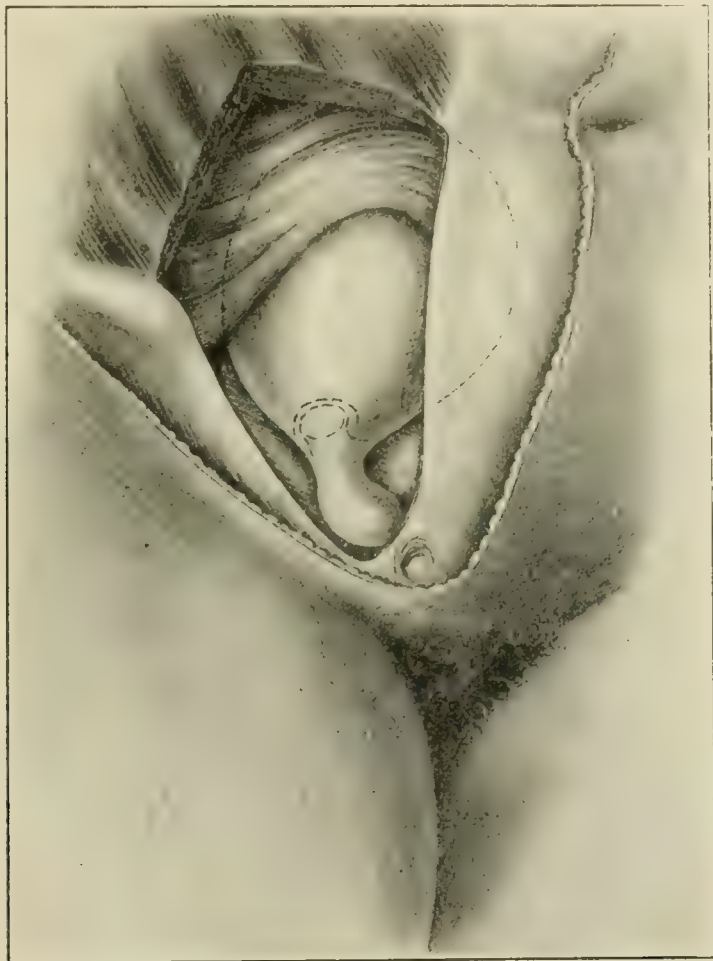


FIG. 6.—Properitoneal hernia (inguinal) in the female.

which extended upward beneath the internal oblique muscle and the aponeurosis for a distance of at least 3 inches. Upon opening the sac, it was found to be empty. The neck of the sac, about one inch in diameter, was situated at about the site of the normal internal ring. The anatomical situation of the sac between the internal oblique and transversalis fascia is well shown by the accompanying illustration (Fig. 6). The sac was removed, the opening in the peritoneum was closed, the sheath of the rectus muscle was cut and reflected, and, with the internal oblique, sutured to Poupart's ligament. The patient made an uninterrupted recovery.

The only other case of true properitoneal hernia in the female which I have been able to find in the literature, in addition to the two cases in Göbell's collection, is the case reported by Sultan, in his paper upon "The Mechanism of the Retrograde Incarceration of the Gut,"¹ with three illustrations. In this case, however, no operation was performed. The condition was found at autopsy.

Inguino-properitoneal Hernia had been observed 69 times up to the writing of Müller's dissertation; 67 times in men, and only twice in women. Only 7 were reducible; the remainder showed symptoms of incarceration, and in the majority of cases the hernia was not discovered until the time of operation.

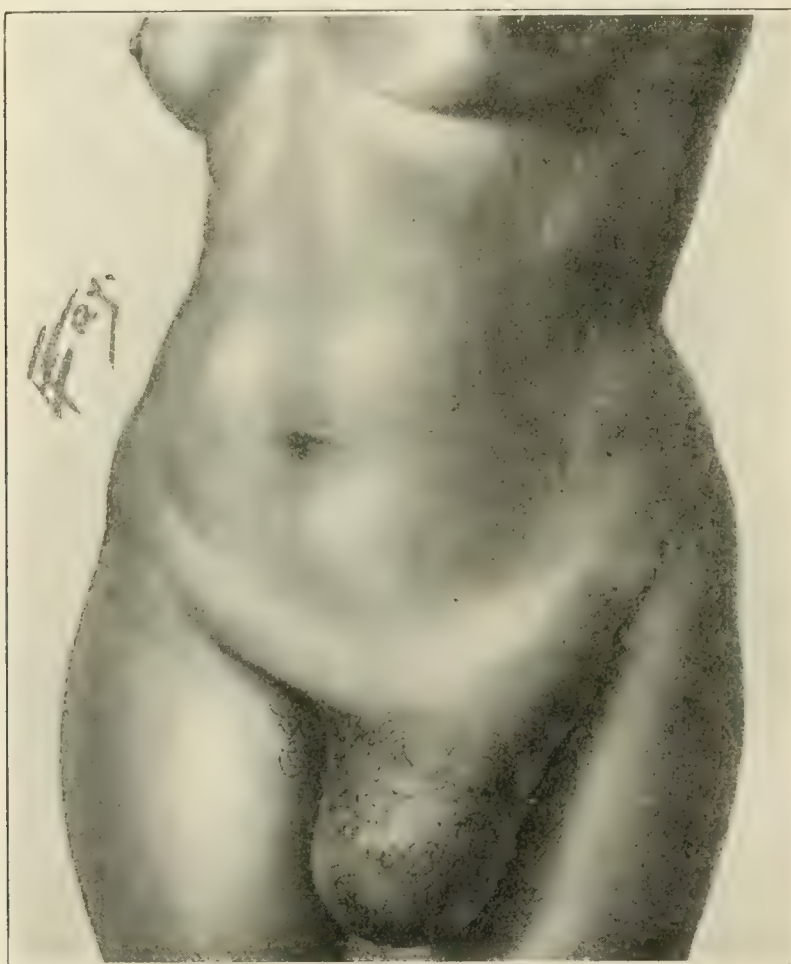


FIG. 7.—Labial hernia.

The hernia was found on the right side in 37 cases; on the left in 23; in 9 the side was not stated; 60 of these herniæ were bilocular.

Of *inguino-interstitial hernia*, Müller found 200 cases reported. Of these, 162 occurred in men, 38 in women; 129 and 34 of these respectively are included in Macready's statistics of reducible herniæ. They were not operated upon, nor was autopsy performed; hence, all anatomical

¹ Centralbl. f. Chir., December 28, 1907.

data are absent. In the remaining cases, the histories are sufficiently explicit to enable one to determine in which interstices of the muscles the sac was found. Most frequently it was noticed between the external and internal oblique, and of this variety, as has been stated before, only 12 cases (including Müller's) are known. My own case makes 13.

The rarest cases of inguino-interstitial hernia are those in which the sac is embedded between the fibres of the internal oblique muscle, or between internal oblique and transversalis fascia. My second case was of this variety.

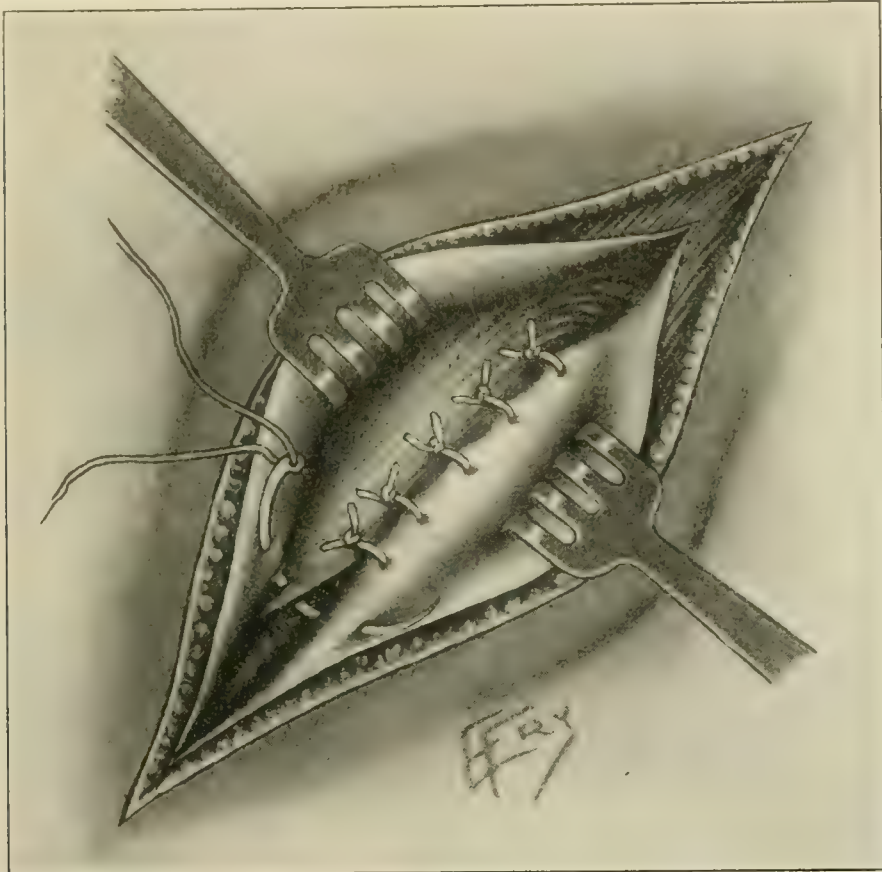


FIG. 8.—Modified Bassini method. Suture of the internal oblique to Poupart's ligament without transplanting cord. Note last stitch placed to include reflected aponeurosis. (Bull and Coley.)

Moynihan even claims that such herniæ have never been seen. It must be stated, however, that Goyrand, Berger, and Venturoli have seen fibers of the internal oblique muscle anteriorly and posteriorly to the sac; in fact, Goyrand considers this a characteristic of this variety of hernia; in Berger's case, the hernial sac was found within the thickness of the internal oblique, and Venturoli was obliged to sever the fibers of the internal oblique in order to reach the sac.

As interparietal herniæ are very apt to become incarcerated, radical operation is the best treatment.

Method of Treatment of Inguinal Hernia in the Female. In a considerable number of cases of hernia in the female in infancy and early

childhood, the hernia is either cured by the wearing of a truss, or, in some cases, even spontaneously.

Method of Operation. The method of operation which I have employed has been the same in the entire series of cases, and consists in an operation practically identical with the modified Bassini operation which Dr. Bull and myself¹ introduced at the Hospital for Ruptured and Crippled in 1892. The only variation from the typical Bassini operation is that the cord is not transplanted, but allowed to emerge

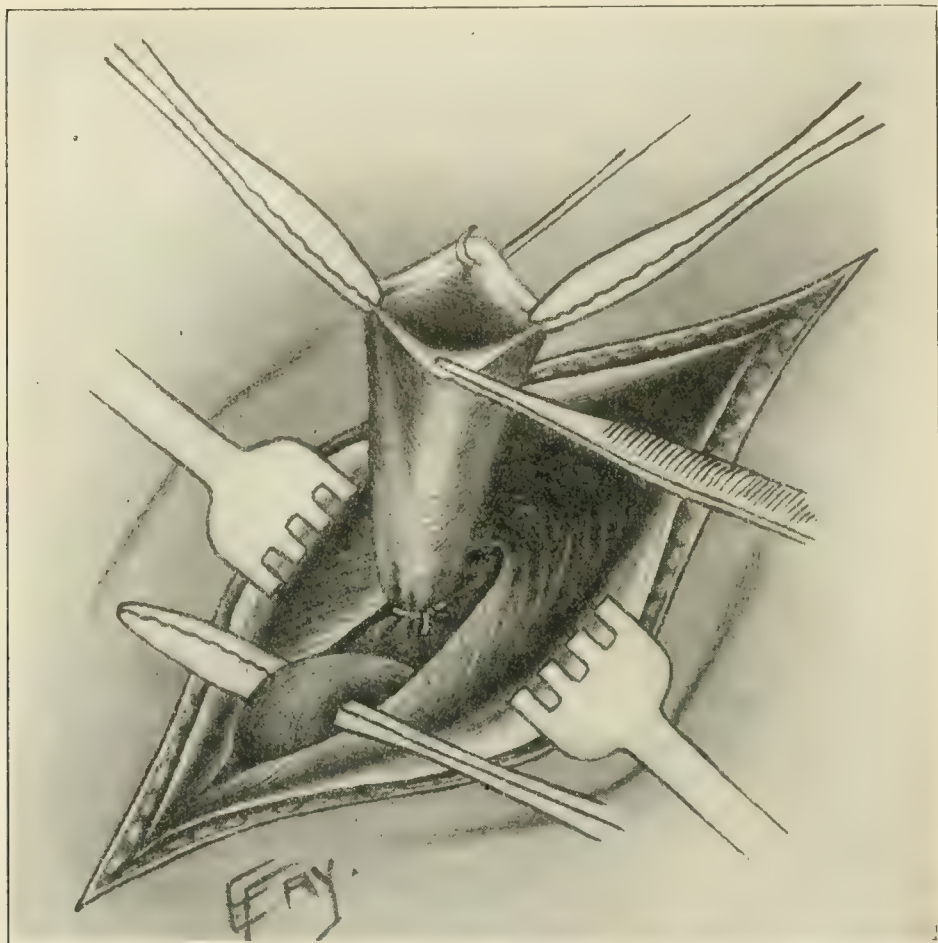


FIG. 9.—Inguinal hernia in female, showing sac dissected from round ligament.

at the lower angle of the wound. In the female the round ligament is treated the same way as the cord in the male, in that it is left undisturbed at the bottom of the wound, the internal oblique being sutured to Poupart's ligament; the aponeurosis is then closed and last of all, the skin, as shown in Figs. 8 and 9.

The transplantation of the round ligament as proposed and carried out by Howard Kelly,² at Johns Hopkins Hospital, is entirely unnecessary, and has not given as good results as when it has been allowed to remain undisturbed.

¹ *Annals of Surgery*, 1895, 1897, and 1898.

² *Operative Gynecology*.

Some surgeons, among them Championnière, have removed the round ligament along with the sac, for the reason that the dissection of the sac from the ligament is much more difficult than the dissection of the sac from the cord in the male.

However, with a little care, and going about the dissection in the right way, one can always separate the sac from the round ligament, and I have always done this, believing it unwise to unnecessarily sacrifice the ligament. The sac is then dissected high up beyond the neck and closed by transfixion with a catgut ligature, the wound being then closed in the way I have described in the modified Bassini operation (the Bassini method without the transplantation of the cord).

Results. In this series of 353 cases there has been no death and but two relapses, and the large majority of cases has been traced to final result. One of the relapses occurred in a woman, aged thirty-five years, two years after operation, and was brought on by very heavy lifting, which, at the same time, caused a hernia on the sound side. The second relapse was anticipated, for the reason that the operation was performed in a woman, aged thirty-five years, seven months pregnant, with a very large strangulated inguinal hernia the size of two fists. The sac and outlying tissues, including fascia and muscles, were infiltrated with exudate and the gut was in a precarious condition. The operation was performed as rapidly as possible, and the wound closed with drainage. Extensive suppuration followed, and although the patient was delivered of a healthy child at full term, the wound had not become firm enough to stand the severe strain of childbirth, and relapse occurred shortly afterward.

Kausch¹ reports a case of *interparietal inguinal hernia* in a woman, aged thirty-six years, mother of two sets of twins, born seven and three years ago, respectively. Two and one-half years ago, when carrying one child and trying to lift another from the floor with the left hand, she suddenly experienced violent pain, and sensations as if something had torn or given way. The patient could detect no external evidence of injury at the time, but has since frequently had pain in the left side. Six months later she had whooping-cough, and noticed a swelling in the lower left portion of the abdomen upon coughing. This could be easily reduced, but always reappeared upon exertion or coughing.

On January 21, 1908, she was admitted to the Augusta Victoria Hospital. Upon lying down, the tumor would diminish in size and could easily be completely reduced. At the lower inner extremity of the tumor, an oval gap, 4 cm. long, running parallel with the inguinal canal, could be felt. The upper border of the fissure was formed by a round eminence, which was supposed to be Poupert's ligament; it ran horizontally downward, then upward to the iliac spine.

¹ Beitr. z. klin. Chir., 1909, vol. lxii, No. 2,

The lower boundary of the fissure was formed by the horizontal branch of the os pubis. The probable diagnosis of a crural hernia was made. Operation, performed on January 23, showed a hernia, which, while it had entered the inguinal canal, had not passed the external ring, but had developed laterally, between the aponeurosis of the external oblique muscle and its foundation, the internal oblique. The aponeurosis of the external oblique was attached aborally to Poupart's ligament, and medially to the linea alba. The patient was discharged cured on February 8, 1908.

Kausch points out that these interstitial or interparietal herniæ should be strictly differentiated from the incomplete herniæ, also called interstitial, in which the hernia is confined entirely to the inguinal canal.

Auvray,¹ in his compilation of inguino-interstitial herniæ in women, reported 8 cases of monocular and 6 of bilocular hernia, all but one of which were operated upon, the majority with fatal result.

Berger, whose one operative case is included in Auvray's statistics, saw 8 other cases which were not operated upon.

As regards the development of the hernia in his own case, Kausch gives the following explanation: He believes that there was a congenital disposition to hernia, possibly only a wide internal inguinal ring, an open vaginal process (diverticulum of Nuck), or there may have been a large interstitial diverticulum of the vaginal process. The external inguinal ring was certainly narrow; the aponeurosis of the external oblique was very firm in the lower abdomen; the abdominal muscles were weak; the trauma caused widening or tearing of the inner inguinal ring, and the internal oblique and transversus fibers became separated. The hernia did not immediately come down; the hernial sac became gradually enlarged, and six months later the hernia was apparent.

Pathology and Therapy of Umbilical Hernia in Adults. E. Rugel contributes a valuable study to the literature upon the pathology and therapy of umbilical hernia in adults. He excludes from consideration in this article all herniæ of the umbilical cord, as well as those of congenital origin in infants and young children, holding that these varieties, from a clinical-therapeutic, as well as etiological standpoint, should be treated separately.

As regards the *etiology* of umbilical herniæ, he believes, with Championnière, that the main factor which furnishes the local conditions for the development of such a hernia is the proliferation of preperitoneal fat in the anterior abdominal fascia, causing defects in the same. He does not agree with Fraenkel, who believes that umbilical hernia in the adult is due to anatomical predisposition.

¹ Gaz. hebdom., 1900, vol. i, p. 542.

² Arch. f. klin. Chir., 1909, Band xci, Heft 1.

Ruge's study covers 79 cases, 60 in females and 19 in males. The ages of the patients range between nineteen and eighty-six years; 72 of the cases were extremely stout, 4 weighing over 300 pounds, 1 even as much as 360 (German) pounds.

Information as to the time of development of the hernia was obtained in 64 cases, as follows:

During childhood	2
"Many years ago"	10
Between the tenth and twentieth years	1
Between the twentieth and thirtieth years	12
Between the thirtieth and fortieth years	14
Between the fortieth and fiftieth years	10
Between the fiftieth and sixtieth years	12
Between the sixtieth and seventieth years	1
Later than seventy years	2

The average age at which the hernia developed being forty and two-tenths years.

Most of the patients attributed the hernia to some indirect trauma, such as frequent childbirth, coughing, etc.

Ruge states that the trauma here, as in the great majority of cases of "traumatic" inguinal and crural hernia, is merely an exciting or facilitating factor for the passage of a peritoneal pouch through a pre-existent defect. In umbilical hernia this defect is caused in the way just described.

Of the 79 cases of umbilical hernia reported by Ruge, 52, or 66 per cent., were incarcerated, whereas he states that the proportion of incarcerated herniæ in the entire number of cases observed at the Urban Hospital is about 40 per cent.

Nine of the 52 cases of incarcerated hernia showed complete gangrene. The operative results in these three classes of cases were, naturally, very different, as will be seen from the following figures:

Of the 27 free herniæ, 26 were cured; of these, 18 were traced from one to upward of ten years, with 3 relapses, or 88 per cent. of permanent cures. There were no deaths in this series.

Of the 43 incarcerated herniæ without gangrene, 30 were cured; 1 unimproved; 7 deaths. Reëxamination of the 30 primarily cured cases, from one to ten years later, showed 69 per cent. of permanent cures.

Of the 9 gangrenous cases, 1 was cured primarily; 1 unimproved; 7 died.

The average duration of incarceration in the non-gangrenous cases was forty-six hours; in the gangrenous cases, fifty-seven and five-tenths hours.

Nearly the same difference, as regards results, is seen when dividing the cases according to the size of the herniæ, excluding, of course, the gangrenous cases: Of 17 small herniæ (up to the size of a hazelnut),

96 per cent. of permanent cures; of 16 medium herniæ (up to the size of an apple), 100 per cent. of permanent cures; of 37 large herniæ (fist to double size of man's head), 59 per cent. of permanent cures.

Ruge points out the relative frequency with which the several hernial openings were noted in his cases. In the 79 cases under consideration, 7 had two distinctly separate hernial openings. Cooper considered this a very rare occurrence in umbilical hernia.

Ruge regards this finding of great etiological importance, in that it supports the view that, in umbilical hernia in adults, we have to deal with an acquired fissure formation in the abdominal fascia, due to fatty proliferation.

With regard to the hernial contents, Ruge states that it was principally omentum, small intestine, and transverse colon. The large intestine was found eighteen times in the large herniæ; three times in those of medium size. The small herniæ usually contained omentum and portions of small intestine.

Ruge states that in the entire series of cases there was not one in which complete reduction and suture of the hernial orifice was not finally achieved, and this even in one case in which the hernia was the size of a small keg. Of course, as regards radical operation, there was considerable difficulty in these cases on account of the usually atrophic musculature of the recti.

The steps of the radical operation, as practised at the Urban Hospital, are briefly as follows:

Skin incision; shelling-out and opening of the hernial sac; division of adhesions; careful inspection of hernial contents; reposition; revision of peritoneum on the inner side of the hernial opening; ligation and closure of the sac; closure of the hernial ring; closure of the wound.

Closure of the hernial ring was added to herniotomy in 70 cases, with the following result:

In 27 cases of free hernia, 26 cures and no deaths. Of these, 18 were traced, with 3 relapses, or 83 per cent. of cures. Of 43 incarcerated hernia, 32 cures, 7 deaths, 4 unimproved. Of these, 16 were traced, showing 69 per cent. of permanent cures.

The methods employed for the closure of the hernial ring were as follows: In 9 it was left open, 6 deaths, 3 unimproved; in 6, through-and-through suture, 4 cures, 1 death; in 38, layer suture with excision of the hernial ring, 31 cures. Of these, 13 were traced for from one to ten years, with 4 relapses, or 70 per cent. of permanent cures; in 20, suture of rectus and sheath, 17 cures, 2 deaths; 15 were traced, with 1 relapse, or 93 per cent. of permanent cures. In 5, a wire net was implanted, with 4 cures, 1 of which later relapsed, giving 75 per cent. of permanent cures.

In conclusion, Ruge states that, in view of his experience at the Urban Hospital, it is clear that the better the musculature of the straight

abdominal muscles is preserved, the greater are the chances of a radical cure by operation, which latter consists principally in bringing together the recti muscles. This method has given 93 per cent. of permanent cures in fairly strong individuals of middle age.

If degeneration of the muscles has proceeded so far as to render suture of the same impossible, the prospects of a radical cure are greatly reduced, even though it may still be possible to accomplish separate layer suture of the anterior and posterior rectus sheath. The permanent cures obtained with this method at the Urban Hospital were 70 per cent.

So long as the tendency to fatty degeneration of the abdominal coverings continues, the danger of a recurrence is ever present, some relapses having been observed as late as seven years after operation.

FILIGREE METHOD OF OPERATION. A filigree method of operation for the radical cure of inguinal hernia, with a report of 33 cases, has been recently described by Mr. Lawrie McGavin,¹ of the Seamen's Hospital, London.

McGavin states that the results of operative surgery in the treatment of large inguinal hernia leaves much to be desired, and enumerates the following conditions upon which a permanent cure in inguinal hernia depends:

1. The total abolition of the peritoneal sac or sacs; and here it must be remembered, he says, that one of these may be thick-walled and perfectly obvious, while another may be present which is of the most extreme tenuity, difficult to find, with a lumen only admitting a probe, and yet quite capable of enlarging one day to greater capacity.

2. The *permanent* approximation of the muscular structures of the inguinal canal to Poupart's ligament.

3. The maintenance of the histological character of these structures by careful operative technique and by the subsequent employment of properly regulated physical exercises.

4. On the prolongation of convalescence in the recumbent position for a period much beyond that which is usually accorded to these cases.

With all these conditions, except the last, I fully agree. I do not, however, believe that the ordinary case of inguinal or femoral hernia requires a recumbent position for more than two to two and one-half weeks.

Our own results, at the Hospital for Ruptured and Crippled, and elsewhere, tend to support this view. If we consider the very large herniæ, inguinal or ventral, there is no doubt that a longer period of convalescence may be advantageous.

McGavin states that it was with the idea of bringing *all* cases of inguinal hernia within the scope of operative treatment, of doing away

¹ British Medical Journal, August 14, 1909, p. 357.

entirely with the use of the truss, and to establish a method of treatment which should honestly deserve the name "radical cure," that in 1905 he devised the method which he terms "double filigree method." The method consists in strengthening the walls of the inguinal canal by the implantation of two filigrees of silver wire in the tissues in such a way that subsequent stretching or bulging is rendered impossible.

McGavin states that the results obtained by the implantation of filigrees of silver wire in the cure of ventral herniæ of large dimensions have proved that not only is the area involved rendered permanently unstretchable, but that there is no tendency on the part of the tissues to cast out the structure as an irritative foreign body, even when enormous filigrees are employed. Hence, the idea occurred to him that some such method might be applied to the cure of inguinal herniæ, especially those occurring in elderly subjects; or in adults in whom the strain of occupation is so constant and severe upon the abdominal walls that a cure by the ordinary methods cannot reasonably be expected; or in those in which the muscular structures of the parts are found to be thin, badly developed, or stretched; or, again, in those in which the hernia has recurred after a carefully executed operation followed by primary union; and lastly, in those in which the hernia is of such a size that the gap cannot be closed without the exercise of such tension as would produce strangulation of the structures within the grip of the sutures.

After fully describing the method of manufacturing and applying the filigrees, McGavin points out the imperative necessity of perfect asepsis.

He directs that the filigrees should be placed in ether for five minutes to remove all grease from them, and should be left in the sterilizer, *in the centre of the most actively boiling area*, until the moment of implantation.

The operation proper is, at first, conducted exactly as in doing an ordinary Bassini closure, except that the aponeurosis should be split to a point rather farther out, and the peritoneum must be more freely separated from the posterior surface of the conjoined tendon, as must the latter from the aponeurosis overlying it. From this point the steps are as follows:

After isolating the sac, the cord is held out of the way and the first two of the sutures which are to approximate the conjoined tendon to Poupart's ligament are inserted, and their ends caught by pressure forceps. These sutures being held aside by the assistant, the pubic section of the filigree is placed upon the peritoneum, its narrow end being close to the pubic spine and its wide end at the inner margin of the internal abdominal ring; then the conjoined tendon is brought into close apposition with Poupart's ligament *over the filigree*, by the two sutures already inserted; additional sutures are inserted accord-

ing to necessity, care being taken to keep the bed in which it lies as dry as possible. In cases in which the muscular wall of the abdomen external to the internal ring is sound and strong, the cord is placed in position, and the iliac section of the filigree is taken from the sterilizer and is placed beneath the aponeurosis in such a way that its inner end lies over the internal abdominal ring and upon the cord for a space of $\frac{3}{4}$ of an inch, the outer end being carried outward and laid upon the surface of the internal oblique muscle, one or two sutures holding it in place (Fig. 10). If the peritoneum is very loose and inclined to sag, the muscular wall is divided from the ring outward toward the iliac spine for about an inch, and is separated from the peritoneum by the handle of a scalpel; upon this peritoneum the outer end of the iliac section is laid and lightly sutured in place; then the muscles are

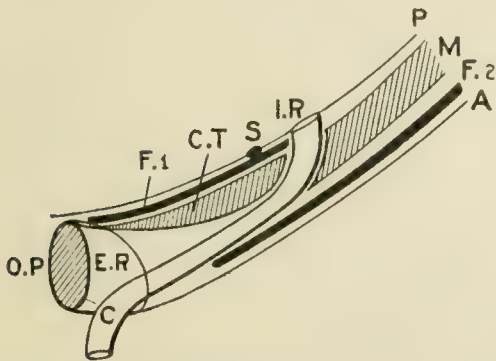


FIG. 10.—Horizontal section of inguinal canal.

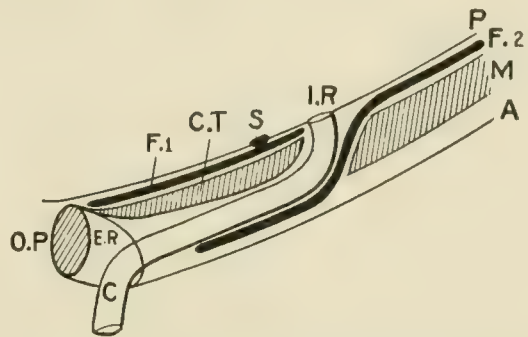


FIG. 11.—Iliac section placed deep to internal oblique muscle external to internal abdominal ring.

A., aponeurosis; C.T., conjoined tendon; C., spermatic cord; O.P., symphysis pubis; F.i., pubic section of filigree; F.ii., iliac section of filigree; E.R. and I.R., external and internal rings; S., neck of sac tied off; P., parietal peritoneum; M., muscle.

brought together again over it (Fig. 11); the inner end lies as already described. Finally, the aponeurosis is sutured in place and the wound closed by means of Michel's clips, which are removed on the fifth day.

McGavin states that "it is obvious that such a proceeding must, in most cases, be comparatively simple of performance; it will be found equally satisfactory in results. Granted a primary union of the wound, the hernial gap will be found to become as impermeable and as unstretchable as a pad of leather. There will be neither pain nor discomfort afterward; there is not the least fear of interference with the cord, nor with the functions of the testis; the operation offers the patient a radical cure in the truest sense of the word."

Upon several former occasions I have discussed in PROGRESSIVE MEDICINE the methods of implanting silver wire, and I confess that up to the present time I have been far from convinced of the value of these implantation methods. Although I have never personally

used them, I have observed at the Hospital for Ruptured and Crippled that the late results of many of these operations were very unsatisfactory; in some, the condition was very distressing. The chief disadvantage I have noted has been the formation of a sinus at varying periods after operation, requiring complete or partial removal of all the silver wire. In one such case, which I have previously referred to, a sinus developed a few weeks after operation, and did not close until all of the wire had been removed at the end of about a year. By this time the recurrence was larger than the original hernia, covered only by thin cicatricial tissue, through which the movements of the intestine could easily be seen. Further operating offered no hope of benefit, and it was practically impossible for the patient to wear a truss.

McGavin's experience, however, shows that it is possible to implant the filigrees of silver wire with a minimum of trouble after operation, and his 33 cases, given in full detail, certainly are worthy of very careful reading. This is the first list of any size of cases treated by the filigree method which have been traced to late results. While many of them are too recent to enable one to pass judgment on the permanency of the cure, taken as a whole they furnish strong evidence of the value of the method in dealing with this limited, but very difficult class of cases when treated by the ordinary operations.

MYOPLASTY. E. Streissler¹ describes a method of *myoplasty for large inguinal hernia*, in which the ordinary radical operations can no longer be effectively employed. He reports a case in which he used the method to his entire satisfaction.

The patient, a hard-working woman, aged forty-two years, first noticed a small inguinal hernia on the left side, in 1897; the tumor increased in size, and she submitted to an operation in 1902. Since then she has had three radical operations for relapse, and on January 1, 1901, entered the Graz Clinic with a hernia that had recurred for the fourth time. In view of the frequent surgical interventions and the fact that wound healing had not always taken place by primary intention, a fistula having delayed wound healing by four weeks at the time of the last operation, it was not thought likely that a fourth operation of the usual sort would be any more successful than former ones. It was, therefore, decided to try myoplasty in this case. The operation was performed on January 5, 1909, and consisted in the following:

Incision of the skin in the old scar, and freeing the hernial sac. It was seen that the lateral section of Bassini's suture had held well, but the medial portion had become completely drawn apart, and in the latter region there was not a vestige of oblique musculature left; the external border of the rectus muscle was atrophied. The successive

¹ Beitr. z. klin. Chir., April, 1909, Band lxii, Heft 2.

steps were splitting of the aponeurosis of the external oblique in the old scar; ligation of the hernial sac and loosening of some adhesions; interrupted suture of the parietal peritoneum and mobilization of the rectus sheath as far as possible; suture of the latter to the remnants of Poupart's ligament with silk; the anterior rectus sheath, which could not be cleanly separated from the external oblique, being matted together with the same, was then attached to Poupart's ligament with silver wire sutures, under considerable tension. A skin incision, about 15 cm. long, was made over the sartorius muscle, about 5 cm. away from the anterior superior spine, in an acute angle. The sheath of the sartorius muscle was split; the muscle and the transverse division about 15 cm. below its origin was exposed. It was then carefully lifted from its sheath and turned around in such a way that the anterior surface of its divided end rested upon the sutured hernial opening. Here the cut surface was fixed to the pubic tuberosity; its lateral, now upper, border, to the lower end of the rectus sheath; its median, now lower, border, to the median portion of Poupart's ligament. The rest of the median portion of the fascia of the external oblique was drawn over the new place of insertion of the sartorius and fastened to Poupart's ligament as far as feasible; the incised wound of the external oblique was united; the skin was sutured; a glass drain was placed in the upper angle of the wound of the sartorius sheath.

The patient left the hospital cured on February 26, 1907, and has since remained free from all trouble, being fully able to perform her arduous work.

Streissler points out that the most essential condition to insuring the success of this operation is, that the nerves and vessels feeding the sartorius muscle be not injured; furthermore, it is of the greatest importance to obtain primary union; all suppuration should be avoided, as this may lead to necrosis of the transplanted muscle.

He further states that, before covering the hernial opening by the transplanted muscle, an attempt should be made, in all cases, to close the same as far as possible by the neighboring muscles, and especially to well cover the new point of insertion of the transplanted muscle, in order to give it a solid basis to heal upon.

MARTIN'S OPERATION FOR UMBILICAL HERNIA. Another contribution to the technique of the radical operation for umbilical hernia is made by E. Martin.¹ While he does not claim his method to be either new or original, he believes it combines the best features of several of the older procedures, the late results of which are by no means ideal. Busse (v. Eiselsberg's clinic) and Krauss (v. Bruns' clinic) having reported 41 to 43 per cent. of relapses after typical omphalectomy and similar methods.

¹ *Deutsche Zeitschr. f. Chir.*, September, 1908.

Martin has used his method in 6 cases at the Evangelical Hospital, Cologne, since 1905. Reëxamination from five months to two and one-half years after operation has failed to show the slightest sign of recurrence in any of the cases. Three of his patients were very stout women, in which the hernia ranged from the size of a goose-egg to the size of a fist; one was a man, and the remaining two, children with herniæ of smaller size.

Uninterrupted wound-healing was obtained in 3 cases; in the other 3 an aseptic hematoma developed in the wound cavity. This was emptied through a small opening made in the suture line. After this, 1 healed without further interruption; in the other 2 some of the silk threads were extruded. Despite this, the result was good.

Martin's method, in brief, is as follows: Transverse oval circumcision of the umbilicus; bilateral lengthening of the incision to the borders of the recti muscles, at the same time dividing the sheaths; exposure of the fascia and aponeurosis; loosening of the borders of the flap as far as the hernial ring; the skin over the hernia itself remaining intact. The peritoneum is opened laterally from the hernial ring; a typical circular omphalectomy is done according to the method of Condamin and Mayo. After protecting the peritoneal cavity by gauze, the two fascial flaps are freed upward and downward, and the recti muscles are exposed. The rectus fibers are carefully separated from the covering fascia, partly by blunt and partly by sharp division. As the aponeurosis flap must remain intact under all conditions, and this is generally most difficult, if not impossible, it is usually deemed wise to desist from splitting that part of the aponeurosis situated in the linea alba, and instead, at the median border of the recti a longitudinal incision is made in the posterior rectus sheath down to the peritoneum. In this way, Martin states, the ligamentous middle aponeurosis is not interfered with, and it remains in connection with the anterior rectus sheaths on both sides. The recti must be freed as far as their diastasis reaches. The lateral borders of the muscles are not interfered with, as the nerves enter here. The peritoneum is then closed. The recti are united in the median line by catgut sutures. The flaps are made to overlap (Mayo). For the fascia, Martin uses silk and catgut sutures alternately. The skin is united by continuous suture; a glass drain is placed on either side for a day or two. The patient is allowed to rest with the knees bent in order to lessen the abdominal tension. A sand-bag is placed on top of the dressing for compression.

Martin does not claim that this method is indicated in all cases of umbilical hernia, but in view of the results obtained, recommends its further trial in umbilical herniæ of medium and large size.

THE RADICAL OPERATION OF "OVER-HERNIE." The "Radical Operation of 'Over-herniæ' with the Help of Systematic Expansion

of the Abdominal Coverings," is the title of a paper by Johannes Hahn,¹ in which he sets forth his method of dealing with herniæ of very large size, which he designates as "Over-herniæ."

The *prognosis* in these large, absolutely irreducible herniæ is very bad on account of the disproportion existing between abdominal cavity and its contents.

There is another group of herniæ, in which he states that reduction is possible during operation, although with great difficulty, in which, however, the patient soon dies of paralysis of the heart.

He then cites a third group, which, although irreducible before operation, can often be quite easily pushed into the abdominal cavity at the moment of operation; these hernia, too, have lost their domicile within the abdominal cavity, as it were, and while the operation may be successfully performed the patients nevertheless die soon after. The empty, more or less paretic gut slowly becomes distended as a result of the formation of gases, thus increasing the intra-abdominal pressure; the liver and diaphragm are pushed upward, compressing the lung and displacing the heart. The patient becomes restless, dyspnea develops, which is followed by cyanosis, the pulse rate increases, and death finally ensues.

After personally observing two consecutive cases in which death was due to respiratory failure following successful operation, he set about to find a way of overcoming the underlying difficulty in these cases, *viz.*, the disproportion between the intra-abdominal space and abdominal contents. He mentions the following means for this purpose:

1. Reducing the weight of the patient.
2. Emptying the intestinal tract before operation.
3. Reducing the volume of the abdominal contents or of the hernia mainly by the excision of omentum and, in cases of need, by resection of the gut.
4. The gradual extension of the abdominal coverings before operation, which latter he considers the most important point.

To illustrate his procedure, he reports three typical cases, as follows:

CASE I.—A farmer, aged sixty-five years, admitted to the hospital October 15, 1902, with a history of having had a hernia for twenty-eight years. Examination showed an irreducible, right inguinal hernia, 59 cm. in circumference, 35 to 40 cm., long, reaching down to the knee. The patient was put to bed and energetic attempts at reduction were made two or three times a day, at first without success. On the third day, a small portion of the intestine could be pressed into the abdominal cavity; a suspensory bandage was applied for the purpose of retention; the same was tightened after each successful reduction of another portion of the hernia; purgatives were given at the same time. On the sixth day

¹ Arch. f. klin. Chir., 1908, Band lxxxv, Heft 3.

complete reduction was possible for the first time; retention was accomplished by means of a strong truss. After each partial reduction, the patient complained of a feeling of great oppression and difficulty in breathing, but was persuaded to stand the discomfort. Preliminary disinfection was carried out on the 28th and 29th; radical operation was performed on October 30. An oblique incision was made about 20 cm. in length; the greatly thickened cord was divided and the stump buried. Many adhesions had formed between the intestines and the hernial sac, which latter had become inverted during reduction; as the inversion had caused no symptoms, the sac was left in this condition within the abdominal cavity. Layer suture of the hernial opening was done with silk; silkworm gut was used for the skin. Primary union followed. The patient left the hospital cured, and was in perfect condition at the time of the report, October, 1907, five years later.

CASE II.—A man, aged fifty-eight years, was admitted on July 13, 1905 with a right inguinal hernia, said to have existed for thirty-four years, irreducible for many years.

Examination showed a large, irreducible right inguinal hernia, 70 cm. in circumference, reaching down to the patella. The same procedure was adopted as in Case I; after fourteen days complete reduction was possible for the first time. The hernial opening now allowed four fingers to pass; there was considerable dyspnea, even distinct cyanosis, which continued for six days. On August 4, operation was performed. An oblique incision, 12 to 15 cm. in length, was made parallel with Poupart's ligament. The isolation of the sac was very difficult, partly impossible; the cord was enormous, and was dissected from the sac with difficulty. Ligation was performed in sections, and division accomplished. The abdominal stump was buried; the hernial sac was divided, and the stump was united by purse-string suture and likewise buried in the abdominal cavity. The sac was extirpated; the different abdominal layers were freely dissected; the muscular aponeurotic coverings of the abdomen were sutured in two layers to Poupart's ligament, and the skin was sutured. Primary union followed. During the first few days after operation considerable dyspnea was present; the pulse was accelerated and the temperature was normal. The patient left the hospital cured on August 27, and was well at the time of the report, a little over two years later.

CASE III.—A woman, aged fifty-seven years, wife of Case II, was admitted to the hospital May 24, 1904, with an umbilical hernia which had existed for twenty-eight years. Examination showed a very stout, otherwise healthy woman with a large umbilical hernia 55 by 44 cm. in diameter. The skin of the hernial sac showed many cicatrices of former ulcerations. Fat-reducing treatment was instituted; an attempt was made to force the hernial contents into the abdominal cavity by means of a rubber-web bandage, but it failed. As no headway

was made with reduction, and as a partly healed ulcer in the hernial sac reopened, a preliminary operation was done on June 14. A horizontal skin incision, 10 cm. long, was made at the upper border of the tumor; the hernial sac was isolated and opened; an attempt at reposition was unsuccessful; the hernial opening was enlarged upward, whereupon a large portion of the hernial contents could be pushed into the abdominal cavity. The skin was sutured with silk and a gauze retention bandage applied. The patient experienced so much difficulty in breathing during the night that the bandage had to be loosened; dyspnea continued, requiring repeated change of bandage. On the 20th, the hernia could be completely reduced for the first time. Inversion of the hernial sac into the abdominal cavity was practised, placing into the same a hollow tin ball covered with gauze. This was well borne by the patient, and the dyspnea improved. On the 24th, as the hernia did not come down, the sutures were removed. Primary union had taken place. The patient, having become greatly exhausted, was now put upon nourishing diet; the retention bandage was allowed to remain in situ. The patient having fully recovered, the radical operation was performed on July 7. After thorough disinfection of the hernia, which was intentionally forced out, the ulcerated areas were circumcised; the adhesions were loosened and the hernia was reduced very easily. The aponeurosis was carefully sutured under considerable tension. The patient complained of moderate difficulty in breathing; the pulse was slightly accelerated; there was some tension of the abdomen. Primary union occurred. The patient was discharged on August 6. Examination in October, 1907, over three years later, showed her to be in perfect condition.

Hahn states that, with the help of this method, all herniæ, no matter how large, may be operated upon with little risk, as all become reducible. If conservative methods fail to even partially reduce a hernia, the cause must be looked for in too narrow a hernial opening. In these cases, the preliminary dilatation of the ring is imperative, in order to render possible the systematic expansion of the abdominal coverings by means of gradual reduction of the hernial contents, the latter being retained by inelastic gauze bandages.

In cases in which the hernial opening is very large, and its closure would materially decrease the size of the abdominal cavity, he has shown that a so-called reserve expansion may be obtained by inverting the hernial sac into the abdominal cavity and filling this cavity with a hollow tin ball of a size as large as possible.

The radical operation is never undertaken until the abdominal cavity easily holds the entire intestinal contents.

Epigastric Hernia. Lindenstein¹ contributes a paper upon the subject of epigastric hernia, or hernia of the linea alba.

¹ Beitr. z. klin. Chir., 1908, vol. lvii, Heft 2.

Opinions as to the *frequency* of this form of hernia still differ greatly.

Küttner found 12 epigastric herniæ in 5300 patients observed at the Poliklinik.

Friedman observed 5 cases of epigastric hernia in 2850 patients at the Polyclinic in Britz, while, in his private practice, of 300 patients with stomach trouble, 21 were found to suffer from epigastric hernia. Bohland saw 33 epigastric herniæ in 3420 patients, or 1 per cent. According to Lindenstone, of 13,634 patients treated in the surgical section of the Nürnberg Hospital during the five years from 1903 to 1907, 850 were operated upon for hernia, and of these, only 13 were epigastric herniæ. Fillipini reports 12 epigastric herniæ in 2156 hernia operations; Friedrich, 54 cases of epigastric hernia in 5500 patients, and Berger estimates the frequency of epigastric hernia as 1 per cent. of all forms of hernia.

As regards *sex and age*, it has been found that epigastric hernia occurs far more frequently in men than in women, and usually among the laboring classes in the very prime of life, between the ages of thirty and forty years. Of Lindenstone's cases, eleven were men and two were women. Very few cases of epigastric hernia in children are known. Klausner found three such cases recorded, to which he added two of his own. Hagedorn reported two cases, and Astley Cooper one case, with three herniæ in the linea alba.

With regard to the *contents of the hernial sac*, Lindenstone states that in the majority of the cases it is formed by the omentum.

As to *size*, in this form of hernia they are usually small, ranging from the size of a bean to that of a hazelnut.

Owing to the manner in which the fibers of the linea alba cross each other, the numerous apertures for the passage of vessels are not round, but rhombic in outline. These fibers, which interlock like the fingers of folded hands, may be forced apart by tension, and it has been seen that small subserous lipomas are pushed through these apertures between the fibers, gradually widening the spaces and finally changing them into hernial openings. This is one of the most generally accepted etiological factors in the development of epigastric hernia, and operation often shows the combination of a subserous lipoma and a hernial sac. It was seen five times in the thirteen cases reported by Lindenstone. In many cases the isolation of the lipoma and the hernial sac is most difficult on account of the delicate structure of the hernial coverings and the adhesions which are usually present between the lipoma and the sac. Dittmer considers it possible that, in the cases in which the sac cannot be isolated, a primarily formed sac may have been transformed into a fatty tumor.

According to Lindenstone, the point of greatest importance with regard to the etiology of epigastric hernia is the congenital weakness of the fascia and abdominal parietes, as shown by the frequent occurrence of epigastric hernia in conjunction with other abdominal herniæ and

the fact of their multiple occurrence. Lindenstein's cases showed three instances of multiple herniæ, and a combination with other herniæ five times. Malgaigne reports 18 cases of epigastric hernia, 14 of which were associated with other herniæ. Hahn has published four cases of epigastric hernia, with two cases of double inguinal hernia.

Lindenstein holds that these two factors argue against the traumatic origin of epigastric hernia, while they confirm his opinion that the congenital weakness of the linea alba undoubtedly represents the most important factor in the development of these herniæ, furnishing the predisposition to the formation of pure epigastric herniæ as well as those that are complicated by a subserous lipoma.

As regards *symptoms*, Lindenstein states that two forms of epigastric hernia come into consideration, namely, the insidiously developing, slowly growing variety, and that which appears suddenly under symptoms of incarceration. These herniæ often remain latent for a long time, until, owing to some unusual exertion, they become apparent and give rise to trouble. In one of his own cases the little tumor had existed for eleven years before it caused any discomfort. In the majority of cases, however, he says, the patients suffer for years before the real cause of the trouble is discovered. The most common symptoms are gastric disturbances, so that the greater portion of epigastric herniæ are diagnosed as "stomach trouble." The pains are spasmodic, and usually become worse with exertion and after eating. Application of pressure greatly enhances the pain, which generally radiates from a point corresponding to the hernia. It is a characteristic that the intensity of the pain changes with a change of position on the part of the patient. Vomiting is often seen at the height of an attack. True incarceration has been observed in this form of hernia.

Lindenstein states that the diagnosis is not difficult so long as one bears in mind the possibility of an epigastric hernia.

As regards *differential diagnosis*, the following conditions come into consideration: Ulcus ventriculi, carcinoma ventriculi, gastritis, gastrectasy, gastralgia, cholelithiasis, nephrolithiasis, and neuralgias.

The *prognosis* is good after the diagnosis has been correctly made.

Operation is the only method of treatment that comes into question.

Lindenstein describes the operation which he now practises at the hospital, and which corresponds to Graser's operation for large ventral herniæ, as follows: A transverse incision of the skin fascia, 6 to 8 cm. in length, is made over the apex of the tumor. Then the rectus sheath is transversely divided and freed from the muscle for a short distance; the sac is carefully isolated; the same is opened and the contents are reduced, or the adhesions loosened. Then the sac is either closed by purse-string suture and the stump buried, or the opening is united by means of a continuous peritoneal suture, the posterior rectus sheath being grasped in the suture. The rectus muscles are approximated by from three to

five interrupted catgut sutures, over which the anterior rectus sheath, fascia, and skin are united by silk sutures.

Lindenstein states that wound healing occurred without complication in all his cases, and the patients left the hospital in two weeks.

As regards late results, 12 of the 13 cases reported by Lindenstein were traced for from five to six years after operation. Eleven cases of these he personally examined. All patients had remained free from a recurrence of their former troubles; they were in excellent health and capable of continuing in their sometimes arduous work. In two instances a relapse had developed, which, however, did not cause the patients any inconvenience; in fact, they were not aware of it. Lindenstein believes that the method above described, which has been practised at the hospital for the last six months only, will tend to avoid even slight relapses in the future.

Lindenstein remarks that the danger of relapse in epigastric hernia is generally recognized. Pott reported 50 per cent. of relapses in abdominal hernia in general; Vulpius found 6 relapses in 41 cases operated upon for epigastric hernia. Le Page reported 13 permanent cures and 3 relapses. Witzel observed 5 relapses in 25 operations.

Primary Tuberculosis of the Hernial Sac. Jacob and Trénel¹ point out the fact that the study of tuberculosis of the hernial sac is of comparatively recent origin, the first observations dating back scarcely twenty years. Jonnesco, in 1891, collected all the cases reported up to that date and published them in the *Revue de Chirurgie*.

In 1906, Cotte, in a paper upon the same subject, in the *Revue de Gynecologie*, published a series of 136 collected cases.

Jacob and Trénel emphasize the fact that, in the previously reported series of cases, the authors have included under tuberculous hernia all varieties of tuberculosis of the hernial sac, without any reference to the site of the primary lesion. They believe that this is a mistake, and that the time has arrived for greater precision in the grouping of these cases. They believe this is possible, and their own paper is based upon a study of primary tuberculosis of the hernial sac, their definition of which is as follows: Primary tuberculosis of the hernial sac is characterized by localization of the tuberculous process in the wall of the hernial sac, a localization which leaves untouched the other elements of the hernial sac. They report a case of their own in a soldier of good general health, who was operated upon by them in February, 1908. The sac, which was resected high up, showed a marked thickening and presented signs of inflammation. In addition to this, there were several small nodules, 4 or 5 in number, presenting the aspect of tuberculous granulation. The patient made a normal recovery, and, so far as the statements made go, left the hospital entirely cured. The case which was operated upon

¹ *Revue de Chirurgie*, 1908, No. 9, p. 390.

in February was reported in September; the subsequent history is not given. A careful histological examination was made of the sac. Jacob and Prinell believe their case is an undoubted example of primary tuberculosis of the hernial sac; no other tuberculous lesion could be made out in any other part of the body. The patient seemed in excellent health. They believe that primary tuberculosis of the hernial sac is an extremely rare affection, an analysis of the work of Cotté showing that in 70 per cent. of the so-called tuberculous herniæ, the process of the sac was really secondary to a general invasion of the peritoneum, while 20 per cent. followed tuberculosis of the genital organs. If we exclude all cases which should not be properly classed as tuberculous hernia, there remain only 7 or 8 per cent. in which the sac may be regarded as the site of the primary lesion. Of such cases, they have collected ten examples—three reported by Jonnesco, three by Broca, one by Albertin, one by Faguet, one by Thomas, and one by Lewison.

ETIOLOGY. In regard to the etiology, according to the work of Jonnesco, it would appear that primary tuberculosis of the hernial sac was a disease more frequently seen in the elderly, while a study of the more recent cases shows that it occurs almost as frequently in infants and young adults. Jacob and Trénel's case occurred in a young adult.

The question arises as to whether the variety of the hernia can be considered a predisposing factor. Jacob and Trénel believe that it does not, as the lesion is found in inguinal as well as in femoral herniæ, yet it is more frequently seen in inguinal than in femoral herniæ, which finds a natural explanation, however, in the relatively greater frequency of the inguinal variety. Jonnesco believes that old, voluminous and irreducible herniæ offer a predisposition to tuberculous changes. Jacob and Trénel's case, however, occurred in a recent hernia of only three or four months' duration.

PATHOLOGICAL ANATOMY. The pathological anatomy is carefully described by the authors. The tubercle in the first period of its development is hard and massive; it may go on to caseation with the formation of pus, or it may produce uniform thickening of the entire sac, or, again, it may take the form of small miliary tubercles scattered over the entire sac wall. This is the form in which I have personally observed it in three cases.

SYMPTOMATOLOGY. Jacob and Trénel describe two varieties, one called the *latent form*, in which there are practically no symptoms. They believe the suspicion of a tuberculous hernial sac should be aroused if, after the reduction of the contents of the hernia, one is able to feel here and there hard nodosities, or a hard, irregular thickening of the sac. The second variety they call the *doloreuse* or *painful form*, which is much more common than the former. In this variety, there is often severe and continued pain, due probably to the formation of adhesions between the omentum and the wall of the sac, or adhesions between the

sac and the perisaccular tissues, which often results in a fusing together of the cord, testicle, and epididymis.

As to the origin of the condition there is considerable doubt; it is probably due to a blood infection, the hernial sac offering the most favorable condition for the localization and growth of the bacilli.

PROGNOSIS. With regard to the prognosis, Jacob and Trénel believe that in the cases in which the disease is primary in the sac, a thorough removal of the same high up will often result in a complete cure.

The cases of primary tuberculosis of the hernial sac thus far reported are too few in number and have been traced for too short a time to justify any conclusions.

Ischiadic Hernia. Köppl,¹ of the surgical clinic at Prague (Wölfler's), contributes an article of considerable value on "Ischiadic Hernia."

Garre, in 1892, made a careful revision of the literature of the subject and was able to collect 11 cases, the first of which dated back as far as the middle of the eighteenth century. Köppl collected 11 additional cases, reported between 1892 and 1908. This, including a case observed at Wölfler's clinic in 1904, brings the total number of ischiadic hernia known to have been published within the last one hundred and fifty years, up to 23.

VARIETIES. According to the foramen through which the hernia enters, there are three varieties of ischiadic hernia which Waldeyer designates as *hernia ischiadica suprapyriformis*, *hernia ischiadica infrapyriformis*, and *hernia ischiadica spinotuberosa*.

Reviewing the direct *causes* given for the herniæ reported, Köppl found trauma 7 times; of these, 5 were the result of indirect trauma; traction due to tumors, 5 times; relaxation of the muscles in three cases; and constipation in one. Five of the cases were of congenital origin. Thirteen of the cases were observed in woman, 8 in men, while in 2 the sex is unknown.

As to the ages of the patients, it is stated that the oldest was fifty-five, the youngest twenty-one years old. The male patients ranged between twenty-one and forty-five years; the female between twenty-two and fifty-five years. The majority of the latter were over forty years old and had borne children; the great majority of the male cases occurred during the third decade.

The *size* of the herniæ varied considerably, ranging between the size of a pigeon's egg and a man's head.

Ten of the herniæ occurred on the left side, 5 being of the suprapyriformis, and the other 5 of the infrapyriformis variety. Eleven were noted on the right side—6 suprapyriformis, 3 infrapyriformis, 1 spinotuberosa.

In most cases the small intestine formed the contents of the sac;

¹ Beitr. z. klin. Chir., 1908, Band lviii, No. 2.

twice the sigmoid flexure was found; four times the ovary, once the omentum, and once the bladder. The latter case is of special interest, since, according to Köppl, it is the only case of cystocele thus far known.

Thirteen out of the 23, or 56 per cent. of the cases, were incarcerated.

The general *symptoms* of ischiadic hernia are very much the same as those of ordinary hernia, although perhaps they are somewhat more obscure. The most prominent symptom was the characteristic ischiadic pain.

The *diagnosis* was rarely definitely made; in more than half of the cases it was not made at all. Lipoma, fibroma, echinococcus, myxoma, and sarcoma may simulate ischiadic hernia.

As regards *treatment*, the same rules and indications obtain as for other herniæ.

The *prognosis*, in view of our present greatly perfected technique, must be considered good, at least *quo ad vitam*. The outcome, of course, is dependent chiefly upon a correct diagnosis, especially in the incarcerated cases. In none of the incarcerated cases was the diagnosis made with any degree of certainty. Hence, of 9 permanently incarcerated cases, 6 died; of 4 temporarily incarcerated cases, 2 resulted fatally.

The total *mortality* of the series of ischiadic hernia reported is 34 per cent.; over 26 per cent. died of their hernia, and half of these were operated upon. The first operation for incarcerated ischiadic hernia was done by Schreger, in 1810 (bladder; fatal).

Tumor of the Tunica Vaginalis. Mühsam¹ reports a case of tumor of the tunica vaginalis, which was found upon extirpating the tunica vaginalis propria during an operation for hydrocele.

The patient, aged thirty-six years, gave a history of having sustained a contusion of the testicle five years ago, resulting in a hydrocele. Examination showed the right scrotum to be the size of a fist; the skin was tense, not adherent to the tumor, which was fluctuating and could not be traced into the abdominal cavity; the testicle could not be palpated. The diagnosis of right hydrocele was made. Operation: Exposure of the tunica vaginalis; isolation of the tunica vaginalis propria. After opening the latter and evacuating the hydrocele fluid, a wart-like tumor was seen upon the tunica vaginalis propria, about 1.5 cm. away from the origin of the cord; the same was covered by the tunica vaginalis; the growth was removed with the excised portion of tunica vaginalis. The wound was sutured and recovery was uninterrupted.

Mühsam believed the tumor to be one of those villous proliferations sometimes normally found in the region of the epididymis or a product of a disease of the tunica vaginalis, designated as villous periorchitis. Microscopic examination, however, showed the tumor to be not a fibroma, but an epithelial tumor of adenomatous structure throughout.

¹ Deutsche Zeitschr. f. Chir., October, 1908.

Mühsam states that it is impossible to say anything definite regarding the origin of the tumor, but believes it to have arisen from scattered germs on the testicle or epididymis, but it certainly had no connection with the injury received, nor was it likely that it had any influence upon the formation of the hydrocele. On the other hand, he thinks it probable that the hydrocele was due to the injury to the testicle five years ago.

Operative Treatment of Inguinal Hernia in Children. Kovács,¹ in his paper on the "Operative Treatment of Inguinal Hernia in Children," advocates operation in all cases, even infants, believing that the risk of operative intervention is *nil*. He states that in 232 cases of free inguinal hernia operated upon at the Budapest Hospital between the years 1897 and 1907 there was but one death, and that was due to a gross error on the part of an inexperienced assistant. He believes that every case of inguinal hernia in children can be radically cured by operation, provided the same is properly done.

As regards immediate results, Kovács states that of 253 children operated upon for hernia at the Budapest Hospital, 21 were strangulated; of the latter, 3 died in from twelve to thirty-six hours after operation. All three were in a condition of profound collapse when placed on the table.

As to late results, they were able to trace 149 of the cases, 5 of which had since died of intercurrent diseases, leaving 144, of which but 1 had a relapse. This patient was operated upon in the very beginning of the existence of the hospital by a young assistant. A second operation has since been done, and the child is now radically cured. This failure, he states, must be attributed not to the operation, but to the inexperience of the operator.

The time of observation in the majority of the cases extends over a period of several years.

The ages of the patients are stated as follows:

Below one year.	10
One year	41
Two years	29
Three to ten years	125
Eleven to fifteen years	48

Kovács adds that in the above cases there were from 10 to 15 who had apparently been cured of their hernia by a truss in early childhood, but in whom the hernia recurred later, and in at least half of the cases in the shape of a strangulated hernia, which fact he considers another reason for advocating operation even in infancy.

Bassini Operation. Noetzel² believes that a strict adherence to the directions laid down by Bassini, in carrying out his operation, will

¹ Arch. f. klin. Chir., 1909, Band xci, Heft 1.
² Beitr. z. klin. Chir., 1909, Band lxi, Heft 3.

insure the best results, and states that in his endeavor to follow Bassini as closely as possible, he has made an anatomical finding which, though unimportant in itself, may often render the operation most difficult, especially in the case of old voluminous herniæ.

The most characteristic and important feature of Bassini's operation, the cause of its good results, he believes to be the peculiar Bassini suture in two layers, with transplantation of the cord between the two rows of sutures. Noetzel states that, if Bassini and Escher report relapses in the shape of internal direct herniæ, it seems to him the recurrences at this place must be ascribed to an insufficiency of the deep sutures in its most median portion, and not to the fact that the newly formed external inguinal ring lacks the protection of the fascia. In the firm union of the abdominal muscles with Poupart's ligament, lies the point of greatest importance in Bassini's operation. It is this part which, he claims, is not always easy to accomplish, unless as recommended by Graser in his description of the operation, all fat and connective tissue be removed from the inguinal canal before starting with the deep sutures. This important step, he states, Bassini himself does not mention, and most other operators have also ignored it. Nevertheless it is only in the minority of cases that the entire hernial fissure is so completely freed at this stage of the operation that everywhere the musculature and Poupart's ligament can be brought into direct contact by suture. In all large and medium-sized herniæ, as well as in most of the small herniæ, Noetzel states that there is a bundle of connective tissue at the median angle of the opening which extends through the hernial opening to the scrotum and which, if it is ignored, is forced in between the borders to be united and thus prevents direct contact of the muscular aponeurotic layer with Poupart's ligament. The older the hernia, the greater is this mass of connective tissue, through which pass large strong veins, which seem to emanate from the scrotal tissue rather than from the scrotum itself. In the median portion of the opening, fibers join this bundle from various directions, forming a more or less distinct band.

Investigations have shown him that the above-mentioned vessels are always present, and, even in the simplest cases, are accompanied by at least some fine connective-tissue fibers. In the last 50 hernia operations these vessels were found absent only in three instances, *i. e.*, in a very small direct hernia, and in two cases of double hernia with a medium-sized hernia on one side and a hernial opening without a sac on the other. The vessels were absent on the side on which there was no sac.

Noetzel also made some investigations upon cadavers, and on centrally exposing these vessels it was seen that the same pass through the internal inguinal ring in close proximity to the cord, and then, after uniting into one trunk, they pass into the inferior epigastric vein.

In Noetzel's opinion, a well-developed cremaster muscle is best used as a support for the deep sutures in the following manner: The carefully

preserved muscle is severed at its insertion, the severed end then being sutured to the ramifications of Poupart's ligament in the median angle of the hernial fissure. The entire muscle thus forms a supporting cushion for the deep suture, without interfering with the direct contact of the sutured borders of the abdominal musculature and Poupart's ligament. Noetzel believes that, in very large old herniæ, the transplantation of the cord, upward and outward, is to be omitted in all instances in which the space between the abdominal muscles and Poupart's ligament is so large that it cannot be properly closed. In these cases the cremaster and the connective tissue accompanying the external spermatic vas are to be preserved in one mass and left in the median angle, together with the cord, in order to help fill out the remaining aperture.

In Bassini's operation in the female, Noetzel states that the round ligament should be carefully isolated and used in the same manner as the cremaster in the male, *i. e.*, it should be divided and sutured to Poupart's ligament without undue tension, and in such a way that the uterus remains in its normal position and the band serves as a supporting cushion to the deep sutures.

In infants, Noetzel believes Bassini's operation is contra-indicated. In these cases he neither splits the fascia nor isolates the sac, but closes the peritoneal cavity by a purse-string suture and the hernial opening by means of a sagittal suture so far as this can be done without compressing the cord.

In older boys he invariably performs the typical Bassini operation. In cases of a retained testicle in the inguinal canal, he never attempts reposition into the scrotum, but invariably transplants it into the abdominal cavity and completely closes the inguinal canal, the same as in the female. He never performs castration, unless the testicle is diseased.

He calls attention to the frequency with which the cecum and appendix are found to form the contents of the hernial sac in children. The appendix is usually of great length in these cases. He recently extirpated one 25 cm. in length, in a child whose entire body was only 80 cm. long.

Relation of Laparotomy Scars to Postoperative Abdominal Herniæ. Lindenstein¹ reports his findings as to the relation of laparotomy scars to postoperative abdominal herniæ. He was able to trace and re-examine 100 cases operated upon at the Nürnberg City Hospital during 1904 and 1905, which allows an observation period of upward of three years. Thirty-eight of these patients were operated upon in 1904, *i. e.*, 18 men and 20 women; 62 were operated upon in 1905, 33 men and 29 women. In one-half of the cases the operation was done for appendicitis. All patients were kept without food for twenty-four hours after

¹ Beitr. z. klin. Chir., 1909, vol. lxi, No. 3.

operation, at the end of which time liquid nourishment was carefully begun, bowel movement being attended to on the second or third day.

Lindenstein's material does not include children, the ages of the patients ranging between twenty and forty-five years.

Of the 51 men, 11 showed hernias; of the 49 women, 9 showed hernias. All of the female patients were hard-working women; pregnancy also acted as a detrimental factor in these cases.

As regards the incisions used, Lindenstein reports the following:

Incision in the median line above the umbilicus	5
Incision in the median line below the umbilicus	32, with 4 herniæ
Pararectal incision	41, with 11 herniæ
Oblique incision	7, with 4 herniæ
"Wellenschnitt" (serpentine incision)	15
Incision according to Pfannenstiel	10, with 1 hernia

The most important points to be considered in this connection, as Lindenstein states, are the method of suture and the manner of wound healing.

In the cases reported, perfect union of the borders of the wound, by means of triple layer suture, was accomplished 53 times; union of the borders of the wound, by means of triple layer sutures up to a tampon in the upper or lower angle of the wound, occurred 9 times; by through and through suture, 9 times; and open tamponade of the entire wound in 29 cases. With regard to the wound healing, it is stated that 62 cases healed by primary union; in 38 cases, the wound healed by granulation.

Subsequent examinations showed that in none of the cases with primary complete closure of the wound, and healing by first intention, had a hernia developed. It was only the cases in which wound healing had been disturbed that showed a hernia.

The 11 cases of hernia observed after pararectal incision were all cases of far-advanced appendicitis-peritonitis with suppurative exudate. The four abdominal herniæ after oblique incision referred to cases of appendicular abscess in which the wound borders were soiled by pus for weeks afterward.

Lindenstein concludes that his investigations have proved that the firmness of the resulting scar after abdominal operations is not dependent upon the direction of the incision made, but upon perfect asepsis, which guarantees wound healing by first intention, and upon careful union of the borders of the wound.

Lumbar Anesthesia. Lindenstein¹ publishes a report of 500 cases of lumbar anesthesia observed during two years at the Nürnberg City Hospital, and expresses great satisfaction with the result. He states, that, while some slight inconveniences and disturbances have been noted, there has not been a single instance of death due to the injection. Postmortem examination of the fatal cases showed not the slightest

¹ Beitr. z. klin. Chir., 1908, Band lvi, Heft 3.

pathological changes in the brain or spinal cord. He states that after trying stovaine, novocaine, and tropacocaine, they have returned to novocaine, which was used in 408 of the cases.

Lumbar anesthesia was employed in 156 cases of unilateral, and in 107 cases of bilateral hernia. Lindenstein considers this form of anesthesia the proper procedure in operations upon the lower extremity, the perineum, genital organs and hernia, provided always that no contraindications exist.

The youngest patient, in whom spinal anesthesia was used, was aged fifteen years. Lindenstein does not consider it advisable to lower this age limit.

Operative Treatment of Undescended Testicle. The subject of the operative treatment of undescended testicle was discussed by me at considerable length in *PROGRESSIVE MEDICINE* of June, 1909, since which time little new has been written.



FIG. 12.—A canal has been made from the inguinal wound to the bottom of the scrotum, and the testicle drawn out through an incision in the scrotum.

One paper, however, "The Technique of Orcheopexy," by Franz Torek,¹ deserves mention. His method consists in bringing the testicle down through an incision in the scrotum, anchoring it to the fascia of the thigh, and uniting the scrotal wound margins with those in the thigh. The method is practically Keetley's operation published in the *British Medical Journal* eight years ago, which Torek has been using for three and one-half years, until recently believing it original, but he very generously states that the credit for having given us this new method belongs to Keetley, whose description of it antedates his first operation.

¹ *New York Medical Journal*, November 13, 1909.

Torek's technique differs slightly from Keetley's. Figs. 12, 13, and 14 show the different steps of the operation very well. Anyone wishing a more detailed description can refer to the original article.



FIG. 13.—The entire posterior lip of the scrotal wound is united with the upper edge of the thigh wound.

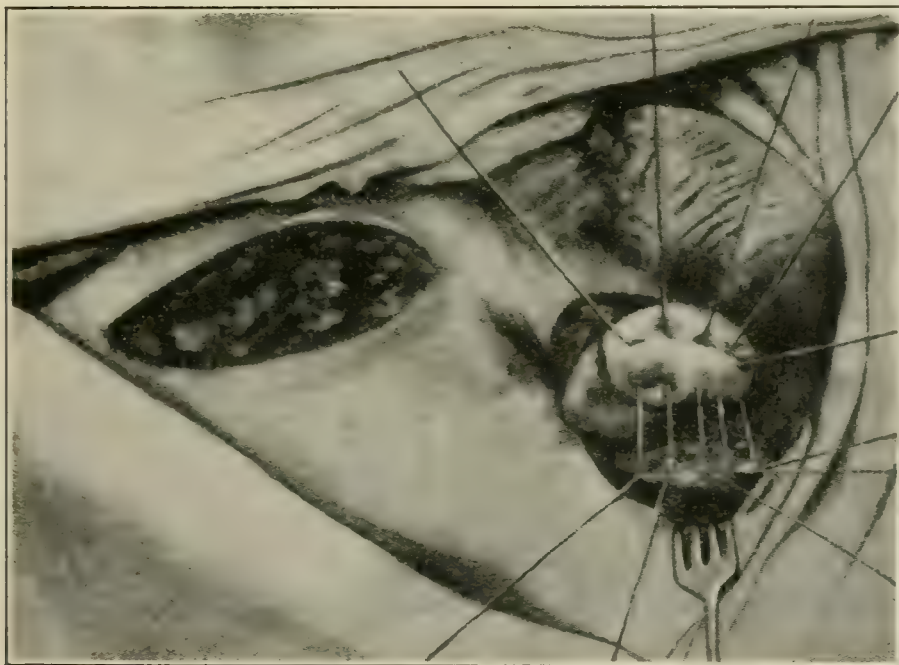


FIG. 14.—Sutures are inserted to unite testicle and fascia.

Keetley's operation I have already discussed in *PROGRESSIVE MEDICINE* several years ago, and pointed out its disadvantages; and when discussing Dr. Torek's paper at the time it was presented before the Genito-urinary Section of the New York Academy of Medicine, I again pointed out the disadvantages. These I believe to be the following:

1. The operation is a very complicated one.
2. It requires two stages—a second operation six months after the first.
3. In cases of double undescended testis, inasmuch as both sides cannot be operated upon at the same time, four operations are required to relieve the condition.

4. The testicle is deprived of its tunica vaginalis, the preservation of which, in the opinion of most writers upon the undescended testis during the last twenty years, has been regarded of great advantage, for the reason that atrophy of the testicle is less likely to occur when it is covered with a tunica.

All of these disadvantages, however, might be overlooked, did the operation give markedly improved results over the simpler methods. This, however, remains to be proved. 'Torek's cases are altogether too few in number, and the time elapsed since operation is too short, to warrant any conclusions as to permanent results.

The Keetley operation, I believe, has been practically abandoned in Great Britain. The simpler methods and their results I have already described fully in the last article in *PROGRESSIVE MEDICINE*.

Cryptorchism. Cryptorchism, according to Kopyloff,¹ was found, upon examination of the recruits for the Austrian army, in the proportion of 1 to 1000; a retained testicle was far more frequently observed than an ectopic one.

Kopyloff refers somewhat at length to the various methods of fixing the testicle in the scrotum, that is:

1. Simple fixation of the testicle to the scrotal fundus.
2. The same fixation, with the formation of a canal for the cord, which prevents the testis from ascending.
3. Extension of the transplanted testicle by means of threads fixed to the thigh or foot.

He states that all these methods give satisfactory results, in that the pathological symptoms disappear, but the testicle does not always remain in the fundus of the scrotum.

He observed 14 cases of cryptorchism in the course of his two and one-half years' service at the Koslow Hospital. During this time he had occasion to operate upon 400 cases of hernia, 8 of which were complicated with cryptorchism, giving a proportion of 2 cases of misplaced testicle to each 100 cases of inguinal hernia.

The ages of the patients ranged between four and fifty years, namely: The patients with an inguinal testicle and hernia were aged four, six, fourteen, fifteen, seventeen and forty-three years; one case, with an incarcerated hernia, was aged twenty-three years; one, with a double hernia, was forty; two with an abdominal testis, were twenty-six and forty-five years respectively; two, with hydrocele, were each aged fifteen

¹ Arch. f. klin. Chir., 1908, Band lxxxv, Heft 4.

years; one, with cyst of testicle, thirty-five years; one cryptorchism without complication, six years.

The operation practised by Kopyloff is as follows: An incision is made along the inguinal canal, the same as in Bassini's operation, and lengthened to the upper part of the scrotum; the testicle is pulled forward and freed from adhesions; the cord is isolated; a canal is formed in the scrotum to receive the testicle; a thread is drawn through the substance of the testicle with two large needles which pierce the scrotum at its root. By pulling the threads, the testicle is drawn into the scrotum and down to the fundus; the threads are tied over a Marly roll; the cord is fixed with a circular suture at the inguinal ring and entrance to the scrotum, which prevents drawing up of the testicle by the cord; the inguinal canal is closed by interrupted suture and the skin wound closed.

The scrotal suture is either removed on the tenth or fourteenth day or left in place until it cuts through itself.

The results of the operation, in 8 patients who were reëxamined a year later, were as follows:

In 4 cases the testicle had remained in place.

In 4, it had retracted to the upper part of the scrotum, but there was entire absence of all subjective symptoms.

Upon the results of operation for cryptorchism, as reported in the literature, and also from his own observations, Kopyloff concludes as follows:

1. Orchidopexy is indicated in cryptorchism, especially if the condition causes pain.

2. In cases in which cryptorchism is associated with hernia.

3. In cryptorchism with hydrocele of the testis and cord.

4. In the cases in which the testicle is situated in the depth of the abdominal cavity, suture of the inguinal ring is preferable.

5. Fixation of the testicle with a removable suture to the raphé of the scrotum, suturing the cord to the inguinal ring and upper part of scrotum, has given satisfactory results, although methods insuring permanency of position of the transplanted testicle would be desirable.

6. Castration should be resorted to only when there are signs of malignant degeneration of the testicle, or when an inguinal testicle cannot be brought into the scrotum.

Hernia of the Recessus Cecalis. A. Reich,¹ in a paper "On a New Type of Pericecal Hernia, the Hernia of the Recessus Cecalis," reports an interesting case of hernia of the right iliac fossa, observed at v. Bruns' clinic. He states that careful anatomical examination has shown it to be the first hernia of its kind in a fossa which hitherto has been considered immune to herniæ.

The patient, a male, aged twenty-seven years, had never been sick and

¹ Beitr. z. klin. Chir., July, 1909, Band lxiv, Heft 1

had never noticed any signs of a hernia. A stone, the size of a fist, was thrown violently at him, striking in the region of the stomach, after which he sank down, half unconscious. He soon revived and managed to reach his home, under great pain, and went to bed. He tried vainly to work a little during the next two days, but as his condition grew worse, he called in a physician. At first he improved somewhat under medical treatment, but soon the abdominal pain as well as meteorism increased again; continued vomiting set in, constipation was present, and the temperature was low. On November 5, 1908, seventeen days after the receipt of the injury, the patient was transferred to the hospital, with the diagnosis of secondary perforative peritonitis following injury to the gut. After careful examination at the hospital, the diagnosis of ileus, of indefinite etiology, without peritonitis, was made, with the possibility of an internal constriction. However, no clue as to the location of the obstruction could be found. An immediate operation was performed. A median incision was made below the umbilicus. Upon opening the peritoneum, enormously dilated loops of small intestine appeared; a small amount of clear, odorless exudate was evacuated. After unavoidable eventration of most of the loops of the small intestine, a collapsed loop was found in the small pelvis. Following the same up to the right iliac fossa, immediately below the cecum, a strangulated loop of small intestine was encountered within one of the peritoneal pockets. This was easily freed; no exit of the watery contents of a hernia was noticed. The strangulated loop showed two typical constriction furrows about 10 cm. apart; no gangrene was present. The exposed constriction ring was about the size of a dime, and was situated directly below the crest of the cecum, but not covered with the same, from about the middle of the venter of the ileum, laterally to the median border of the psoas and the iliac vessels. This constricting ring lead into a cylindrical hernial sac, which could be slightly lifted, together with the hernial ring. The hernial opening was closed by three interrupted silk sutures. Reposition of the enormously dilated loops of intestine was extremely difficult. Layer suture was impossible; through-and-through peritoneal fascia suture, with double silk, finally succeeded in closing the wound. After coming out of the narcosis, the patient repeatedly vomited watery gastric contents. The stomach was irrigated. The next day fecal vomiting set in which could not be overcome despite all efforts; the general condition grew worse; breathing became superficial and rapid. The abdomen was soft, not sensitive, and less distended than before operation. Temperature, 38°. An intrarectal saline injection was given. Fecal vomiting and constipation continued. In the absence of muscle tension and sensitiveness, a mechanical obstruction of some kind was assumed, and the wound was reopened. As mechanical obstruction or partial intestinal paralysis could not be found, and the constriction rings were not gangrenous, the intended enterostomy was, therefore, not done.

The loops of intestine, which were but little distended, were replaced after washing, the wound was covered by a compress, and the wound borders were united over the same by a few sutures. Despite all efforts, the fecal vomiting continued; there was no stool, and on the 9th the patient died.

Reich states that this form of hernia is characterized by the location of the hernial opening within the cecal recess, the place where the plica infra-angularis and parietocecalis became united. The hernial sac represents a retroperitoneally developed diverticulum of this fossa, and seems to take its typical course in the direction of the inguinal canal, by which the intra-abdominal character of this form of hernia may be lost.

Reich holds that herniæ of the cecal and those of the subcecal recess are different in principle. The former, like all pericecal diverticuli, are congenitally performed, although the nature of such prenatal processes has not yet been determined. He further states that herniæ of the iliaco-fascial fossa are not identical with those of the cecal recess.

Hernia Retroperitonealis Treitzii Totalis Accreta. Richard Felten¹ describes a case of hernia retroperitonealis Treitzii totalis accreta observed at the General Hospital in Lübeck, which constitutes the ninth operative case thus far reported.

The patient, a girl, aged fifteen years, had been ailing for six months, before which time she had always been in good health. She complained of spasmodic abdominal pain starting at the left costal arch and extending toward the umbilicus, frequent vomiting at night, and constipation; menstruation had ceased during this time, and the local physician had treated her for anemia; a specialist finally diagnosed an ovarian cyst, and she was sent to the hospital.

Operation, which was performed on May 15, 1908, showed that the entire small intestines, with the exception of an insignificant portion of the lower ileum, was contained in a peritoneal sac which lay principally in the left abdominal cavity; in the region of the duodenojejunal flexure it was broadly fixed upon the posterior abdominal wall; in its right side was an opening from which a piece of ileum extruded; the mass lay behind the colon, or was surrounded by it. Felten states that, although the inferior mesenteric vein was not seen in the hernial opening, there can be no doubt as to the correctness of the diagnosis of retroperitoneal hernia. The loops of intestine within the hernial sac had become extensively adherent among themselves, as well as to the sac, and the latter showed signs of constriction and furrows, which made the diagnosis difficult even during operation. On the other hand, they showed that the hernia might have been present for many years without giving the patient any trouble. Treitz himself averred that, "as matters are at

¹ Arch. f. klin. Chir., 1909, vol. lxxxix, No. 2.

present, the diagnosis of retroperitoneal hernia is impossible," and Felten adds: "The progress that has been made in this direction within the last fifty years has not been great."

He emphasizes the fact that almost all reports published upon the subject of retroperitoneal hernia since Treitz's exhaustive paper in 1857 are based upon pathological anatomical observations; clinical findings have been more generally reported only within recent years, which goes to show that these herniæ generally exist without symptoms, and are discovered accidentally only at autopsy, or that they become rapidly fatal in consequence of incarceration and peritonitis, even before an operation can be performed.

In view of the peculiar site of formation of these herniæ, severe symptoms of incarceration are rarely noted. Treitz gives the following three reasons for this:

1. The hernial opening is in no way connected with muscular apparatus.
2. Only a single loop of intestine lies in the hernial opening, not an afferent and efferent loop, as in other herniæ.
3. The omentum never enters the sac.

Nevertheless, incarcerations have been observed, more frequently in cases of small beginning herniæ, but also, occasionally, in the larger forms in which the sac contains almost the entire small intestine.

Felten does not believe it likely that this form of hernia ever occurs congenitally.

As regards symptomatology, Felten enumerates the following points, the consideration of which he thinks will be of some aid in establishing the diagnosis:

1. Intermittent ileus with localization of pain in the region of the duodenojejunal flexure.
2. Tumor in left portion of abdomen, tense, elastic, almost cystic in consistence, abdomen globular, but sunken in the region of the colon.
3. Tumor resonant upon percussion.
4. The tumor changes in size with evacuation of stool.
5. The tumor can be defined against the female genital organs.

Levy reports what he believes to be a unique case of strangulated abdominal hernia due to a congenital muscle defect, observed at Küttner's.¹ clinic. He refers to Stumme's paper (1903) containing the known cases of abdominal muscle defect up to that time, 8 in number, and calls attention to the fact that all of the cases of congenital defect of abdominal muscles thus far observed have occurred in men.

As to the distribution of the defects of the various muscles in the 10 cases so far published, he states the following:

¹ Beitr. z. Klin. Chir., Bd. lvii, Heft 1.

<i>Rectus muscle:</i>	Cases.
From the first linea transversa	1
From the second linea transversa	2
From the umbilicus downward	3
<i>External oblique muscle:</i>	
Almost entirely absent	2
Rudimentary or weak	6
<i>Internal oblique muscle:</i>	
Entirely absent	1
Almost entirely absent	1
Doubtful	2
Rudimentary	4
<i>Transverse abdominal muscle:</i>	
Entirely absent	2
Almost entirely absent	1
Rudimentary	5

The history of Levy's case is briefly as follows: A male, aged seventy years; a bricklayer; admitted to the clinic in August, 1905, with a history of having first noticed a swelling the size of a small plate on the right side of the abdomen, when thirteen years of age; this is said to have grown but slowly. At the age of thirty incarceration; application of hot poultices brought about spontaneous reduction. Symptoms of strangulation appeared frequently, but could always be overcome by the application of hot poultices. For four years the patient has also noticed a swelling on the left side, which, however, has never shown symptoms of strangulation. On July 31, 1905, severe pain was suddenly felt in the left side of the abdomen; there was considerable increase in the swelling; vomiting; no stool. There were three swellings on the right side, in the lower one of which the testicle could be palpated. The left side, which was very painful, showed a swelling much smaller than on the right side; there was a distinctly audible gurgling sound upon pressure; loops of intestine were felt to glide away under the finger. Under the subsequent manipulation the loops of intestine suddenly disappeared with a loud gurgling sound, and the pains ceased. Considerable swelling persisted after reduction of the incarcerated loop. At the inner, lower border of this swelling a second protrusion the size of a fist could be palpated; the same contained the testicle. The scrotum was normal, but empty. Electrical examination showed that the lower half of both recti, as well as the upper portion of both external oblique muscles, were apparently absent; the transverse muscle was doubtful. The patient was discharged from the hospital with an abdominal support.

Reëxamination September, 1907. There had been no signs of incarceration since reduction two years previously. The condition was practically the same.

Levy states that, in the absence of complications, the treatment of abdominal herniæ due to muscle defects should be mechanical, *i. e.*, the patient should be fitted with a suitable abdominal support.

Results of Operation for the Radical Cure of Hernia. The question of the transplantation of the cord in inguinal hernia in the male cannot, as yet, be said to have been entirely settled. Our statistics at the Hospital for Ruptured and Crippled have the great advantage that the cases operated upon by the different methods were operated upon by the same men and upon the same general class of patients.

From December, 1891, to January 1, 1910, 2732 operations have been performed for different varieties of hernia, as follows:

Inguinal hernia in the male	2029
Inguinal hernia in the female	502
Femoral hernia	110
Umbilical hernia	52
Ventral hernia	29
Epigastric	9
Lumbar	1

There have been six deaths, or a mortality of 0.22 per cent.

In the cases of Bassini's operation for inguinal hernia in the male, the cord was transplanted in 1451 cases, with 9 recurrences, or 0.61 per cent.; in 578 cases the cord was not transplanted, with 6 recurrences, or 1.04 per cent. This gives 15 recurrences in the total number of operations for inguinal hernia in the male, or 0.73 per cent.

My experience thus far leads me to advise transplantation of the cord in all cases of direct inguinal hernia, and in practically all cases of oblique inguinal hernia in adults. In children the results are nearly equal, whether the cord is transplanted or not; whatever difference there is, is in favor of the transplantation, as shown by the statistics just cited, all the male cases of which were in children.

I never transplant the round ligament in the female, and the results in inguinal hernia in the female have been superior to any other variety. In the entire number, namely, 502 cases, there have been but three relapses, or 0.59 per cent.

Inguinal Hernia of the Cecum. Carnett¹ has contributed a valuable article upon "Inguinal Hernia of the Cecum."

He states that in nearly one-third of a series of 435 autopsies, Robinson found that the cecum occupied what he terms the potential position. The mobility of the cecum was so great that it was found in diverse positions within the abdominal cavity; it could be made to touch every abdominal viscus and could enter any abdominal ring.

Carnett states that the congenital form of cecal hernia may originate in any one of the following three ways:

¹ Annals of Surgery, April, 1909, p. 491.

1. The mobility of the cecum and its proximity to the internal ring easily permit its entrance into a patulous vaginal process, either before or after birth, forming a congenital inguinal hernia. The cecum itself is clothed throughout by peritoneum and lies within the hernial sac. The contents of the sac may be cecum and appendix only, or there may be in addition, parts of the ascending colon, small intestine, and omentum. Adhesions from inflammation of the sac, cecum, or appendix may form subsequently, and prevent reduction.

2. The cecum may be actively drawn into the vaginal process by means of its excessively developed connections with the testicle. About the seventh month of intra-uterine life the testicle lies within the abdominal cavity near the internal ring. It is loosely attached to the posterior abdominal wall by its mesorchium. The two peritoneal layers of the latter are continued upward as a peritoneal fold enclosing the spermatic vessels. This fold, termed the *plica vascularis*, terminates on the right side in the appendix, cecum, ileum, or primitive mesentery. The theory has been advanced that the descent of the testis exerts sufficient pull on this fold to drag the structures attached to its upper extremity into the *processus vaginalis*.

3. When the cecum descends to the iliac fossa as early as the fourth month, adhesions may form between the cecum or appendix and the posterior parietal peritoneum covering the testis or gubernaculum. The subsequent descent of the vaginal process and testis will draw the cecum into the inguinal canal, forming either a congenital or an infantile hernia.

Acquired hernia of the cecum, Carnett states, may be classified as (1) simple, and (2) gliding. The latter, called by the French "*hiernie par glissement*," may be subdivided into (*a*) the intrasacular (*b*) the extrasacular or parasacular, and (*c*) the sacless.

As regards the relative frequency of the various forms of hernia of the cecum, Carnett cites the statistics of Hildebrand and Gibbon, who have collected 139 and 63 cases respectively, only 4 of which are duplicated. Of these 198 cases, 128 were right inguinal, 24 left inguinal; 12 inguinal, side not stated; 21 femoral, 18 right, 2 left, and 1 uncertain; 11 were umbilical. In a collection of 135 cases of cecal hernia, Koch found the cecum completely intrasacular in 108, of which 86 were right and 22 left, and extrasacular in 28 right-sided and 1 left-sided hernia.

Brunner, in a collected series of 417 cases of herniotomy, found the large intestine to have been in the hernia in 6 per cent. of the cases; the cecum in 2.3 per cent.

At the Hospital for Ruptured and Crippled, in 2200 hernia operations, the cecum alone was found in 18, the appendix alone in 10, and the cecum and appendix in 7.

Baumgartner, in 1905, published 159 cases of sliding hernia. Of these, 64 contained the descending colon, the sigmoid, or both. Four-

teen were appendicular herniæ, 4 right femoral, and 10 right inguinal. In 81 cases, the cecum alone, or in combination with other portions of the intestinal tract, was found to be the hernial contents. Of the entire 159 patients, only 10 were women.

Of 108 cases of sliding hernia operated upon since the introduction of antiseptic and aseptic surgery, Baumgartner found that 71 recovered without accident, 18 recovered after various postoperative complications, 10 had an incomplete operation or rapid recurrence, and 9 died.

Femoral cecal hernia is generally found in the female sex. Of the 21 cases of Hildebrand and Gibbon, 13 were in females, 4 in males, and in 4 others the sex was not stated. This hernia is always acquired, and the cecum may be intrasaccular, extrasaccular, or sacless.

Inguinal herniæ of the cecum are found at all ages, but usually occur at the extremes of life. Baumgartner's statistics show 27 cases over sixty years of age. Of Hildebrand's 80 cases of right inguinal cecoceles, 12 were children under one year of age, and 2 were fetuses at the eighth month.

Aside from congenital cases, hernia of the cecum is nearly always of slow development.

With regard to treatment, Carnett concludes that "no single method of dealing with the sac and intestine is applicable for all cases; the surgeon must be guided by the conditions in each individual patient. The sacless herniæ are always small, but usually it is possible, if deemed advisable, to secure a peritoneal covering by a slight modification of Berger's method of forming a meso for extrasaccular hernia.

"After reduction, the parietal wound may be closed by any of the usual methods applicable for inguinal hernia."

Rare Types of Hernia. At the last meeting of the American Surgical Association, June 4, 1909, I reported¹ two very rare cases of hernia; the first, a strangulated *retroperitoneal hernia of the intersigmoid fossa*; the second, an *intraparietal ventral hernia at McBurney's point* (Figs. 15 and 16).

Only three cases of retroperitoneal hernia of the intersigmoid fossa have been reported in the literature, and my own case, so far as I can learn, is the only retroperitoneal hernia existing at birth. The other three cases were: one by Eve,² one by McAdam Eccles,³ and the third by Lambret.⁴

My own case occurred in an infant, a boy, born September 8, 1907, weighing seven and one-half pounds, and apparently normal in every way at birth. The only unusual thing noticed within the first twenty-four hours was the fact that the child cried almost constantly.

There was no vomiting, and two meconium stools passed normally.

¹ Annals of Surgery, July, 1909, p. 239.

² British Medical Journal, June 13, 1885.

³ St. Bartholomew's Hospital Reports, vol. xxxi.

⁴ L'Echo Medical du Nord, 1897, p. 384.

The crying continued, although at the end of the second day, when the mother's milk began to come, it nursed satisfactorily, but no bowel movement occurred, though the napkins were stained occasionally with fecal matter. Fifty-four hours after birth the abdomen was slightly distended; the distention, however, was apparently symmetrical; no

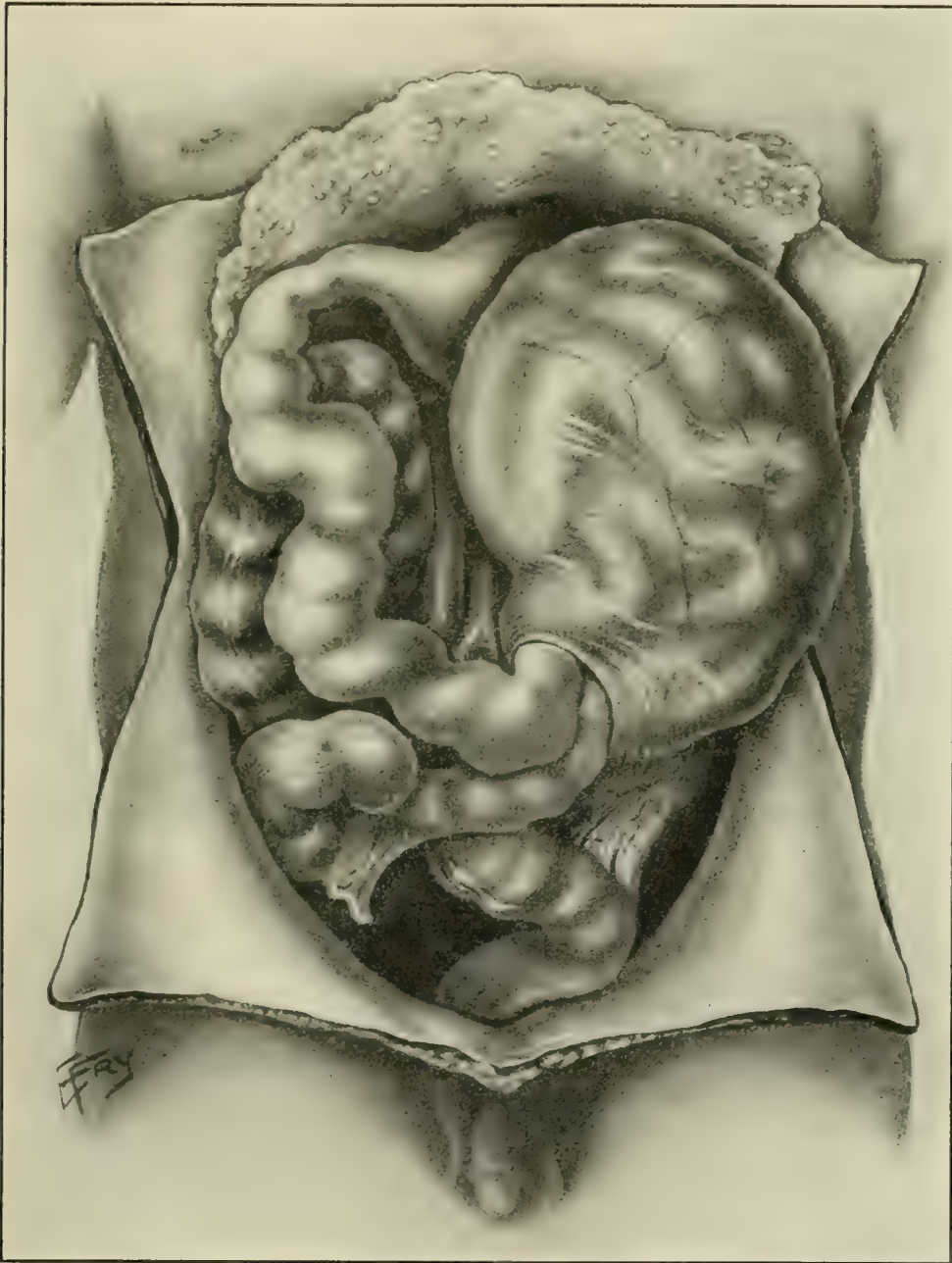


FIG. 15.—Strangulated congenital hernia of the intersigmoid fossa, in child of three days old. (Coley.)

tumor could be made out nor any dulness noted. Eighty hours from birth the child developed a temperature of 102° and began to vomit. An attempt to pass a tube into the rectum failed; the catheter entered only two or three inches. The patient became rapidly worse, and died ten hours later, in the beginning of the fourth day after birth.

An autopsy was made two hours after death, in the presence of Dr. Mackenzie, of Millbrook, New York. Upon opening the peritoneal cavity, an immense gush of air mixed with an emulsion of feces poured out, causing the abdominal walls to collapse. Between a pint and a quart of yellowish liquid feces (there was no pus or anything resembling purulent material present) was found lying in the abdominal cavity.

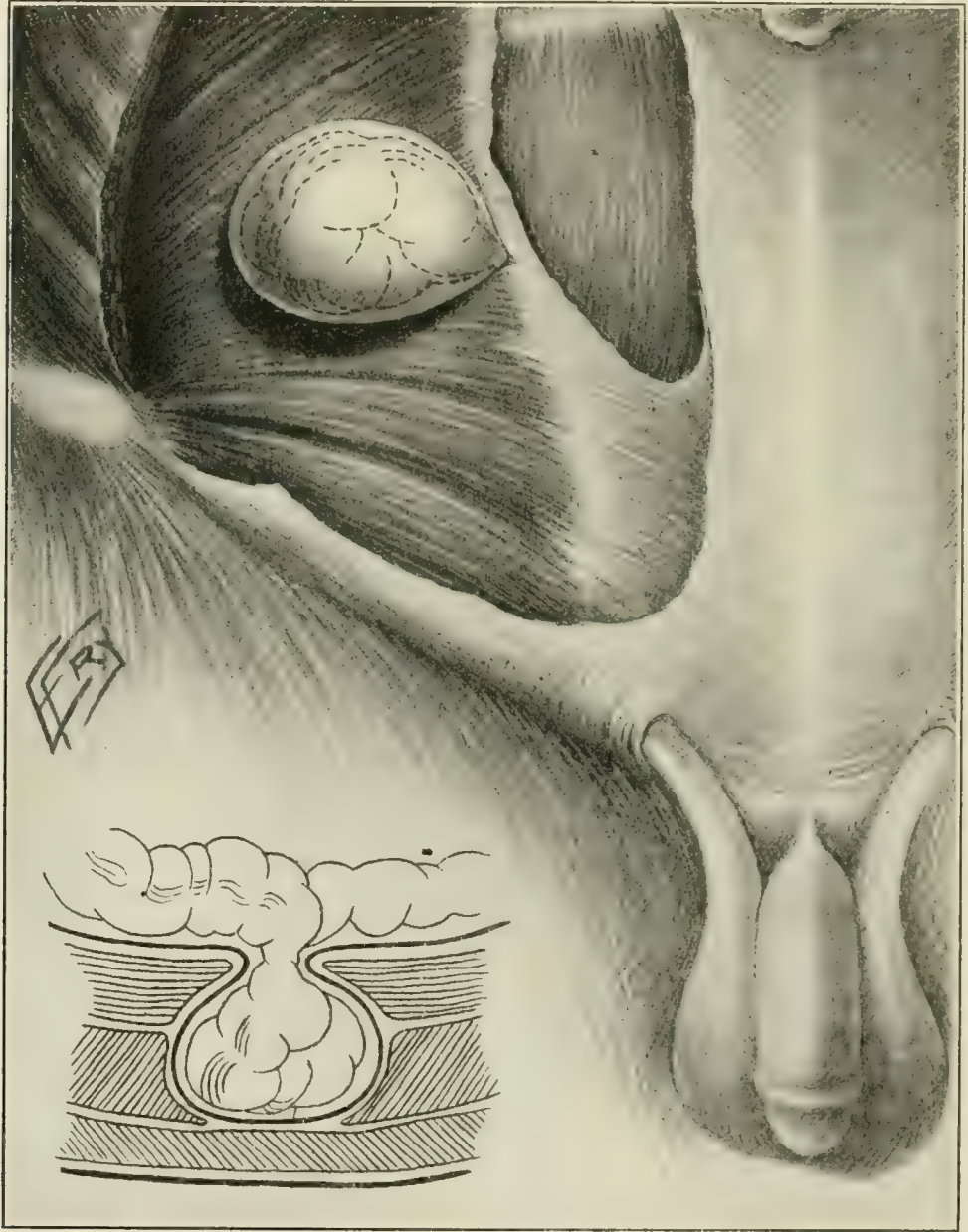


FIG. 16.—Interstitial hernia at McBurney's point. Sac containing cecum. (Coley.)

When this was evacuated, I was immediately struck with the absence of the intestine. Careful search revealed only a small loop of small intestine, deeply congested and distended; there was, however, a globular tumor occupying the left side of the abdomen, beginning on a level with the bifurcation of the common iliac artery and extending up nearly to the costal arch. This swelling was smooth, symmetrical, and resilient

on pressure. Finally, I discovered at the lower edge of the swelling a semilunar fold of peritoneum, situated a little to the left of the vertebral line and just on a level of the bifurcation of the iliac artery. This semilunar fold formed the neck of the retroperitoneal sac. The aperture was one and one-fourth inches in diameter, easily admitting the index finger. The posterior parietal peritoneum had evidently been lifted forward, forming the hernial sac, which contained almost the entire small intestine. The sigmoid turned sharply to the right, and the whole large intestine was entirely on the right side. The intersigmoid fossa must have been abnormally large, containing some, perhaps nearly all, of the small intestine at birth. On the other hand, it is possible that only a portion of the intestine occupied the fossa at birth, and that the constant crying during the first two days may have forced more and more of the intestine into the sac until practically the whole small intestine was included and later strangulation occurred.

While it is possible that, had the condition been recognized on the first day, an immediate operation might have been successful, still, the difficulties in the way of an early diagnosis in such a young infant must be regarded as very great. There was no localized tumor; the child continued to take food until near the end, and vomiting was a very late symptom.

Jonnesco divides retroperitoneal hernia into four classes: (1) *Herniæ* through the foramen of Winslow. (2) *Herniæ* in the retroduodenal fossa. (3) *Herniæ* in the retrocecal fossa. (4) *Herniæ* in the intersigmoid fossa.

The intersigmoid fossa has been carefully described by Toldt. Before the time of Toldt, the intersigmoid fossa was believed to be situated between the two folds of the mesocolon of the sigmoid flexure, while in reality, as shown by Toldt, this is very rarely the case, it being usually situated between the parietal peritoneum and the mesocolon. According to Lambret, the orifice of the fossa is best seen by lifting the sigmoid flexure upward and to the right to a level with the internal border of the psoas muscle, not far from the sacro-iliac synchondrosis and the bifurcation of the common iliac artery. In Lambret's case, the falsiform fold was found over the orifice.

In the cases thus far observed, the cavity of the fossa has been of variable length, from 3 to 10 cm., in some cases reaching as far as the level of the pancreas. The shape of the cavity varied according to the intestinal contents, to which it always adapts itself. The origin of this fossa has been explained in various ways. Toldt and Jonnesco believe that it is dependent in a large measure upon the influence of the arteries of the mesosigmoid. Lambret believes that the intersigmoid fossa is the result of a particular mode of development of the peritoneum and the folds comprising the mesosigmoid. In brief, he believes that the fossa is due to an interruption in the process of fusion of the mesocolon, the

fusion with the parietal peritoneum taking place at a point lower than normal. He believes that the fossa is present in about 80 per cent. of the cases, its protected situation being responsible for the very small number of herniæ that occur in this region.

My second case, an *intraparietal ventral hernia at McBurney's point*, was as follows:

Mr. X., aged fifty-three years, had a left inguinal hernia since childhood. Four years ago his horse fell during a polo match and rolled on him, injuring the right side of his abdomen. Not very long after this he began to have pains in the region of the right iliac fossa which, it was thought, might be due to some trouble with the appendix.

I first saw the patient in consultation with Dr. W. L. Culbert, of New York, in October, 1905. Physical examination at that time showed an oblique irreducible omental scrotal hernia on the left side, and on the right side a direct inguinal hernia about the size of an egg. No tenderness or resistance could be detected over the appendix, and it was believed that the pain and discomfort in the iliac fossa was probably due to the direct hernia, which had not been hitherto discovered.

In the latter part of October, 1908, I operated for the double hernia, resected a portion of the omentum on the left side, and found a direct hernia of the bladder on the right side. Both wounds were closed by Bassini's method; primary union followed, and although the patient has led a very active life, riding and playing polo, there has been no recurrence up to the present time.

Immediately after his recovery from the operation he stated that he felt the same pain and discomfort in the right iliac fossa in the region of McBurney's point that he had had before the operation. The trouble was always worse in the latter part of the day, after standing or being on his feet a good deal, and seemed to be relieved by pressure with the hand. I made a number of examinations, but was never able to detect any tenderness or other indications pointing to an inflammation of the vermiform appendix, although the patient localized his pain and discomfort exactly in the region of the appendix. The trouble gradually became more and more annoying, and in November, 1908, I made another very careful examination. During this last examination I made the patient cough several times with my fingers pressing directly over the appendix and I then, for the first time, detected a swelling, or tumor, apparently beneath the aponeurosis of the external oblique. On pressure the swelling disappeared with exactly the sensation that a hernial tumor gives when its contents slip back into the abdomen under pressure of the finger. The swelling could be made to reappear with the patient's coughing, and gave the same sensation upon deep pressure. The aponeurosis was apparently normal. Hence the most rational explanation of the phenomenon was that there was an opening through the transversalis fascia and internal oblique muscle of sufficient size to permit the hernial sac to protrude

until it reached the aponeurosis of the external oblique. I, therefore, made the diagnosis of interstitial hernia at this point. This diagnosis perfectly explained the pain and discomfort which the patient had so long had in this region, and also the gurgling sensations which he stated he had felt from time to time when pressing upon the abdomen in an effort to relieve the discomfort.

I operated upon the patient on January 27, 1909. Incision was made exactly as for an appendicitis operation. The aponeurosis of the external oblique was found intact and very firm. Upon cutting through the aponeurosis, a tumor about the size of a large goose-egg was found. It was of yellowish color, and the outer layer, about one-fourth inch in thickness, consisted of extraperitoneal fat. Upon cutting through this, a hernial sac, the size of a large hen's egg, presented itself. This was opened and found to contain a loop of the cecum, which immediately reëntered the hernial sac as soon as it was reduced into the abdomen, showing that it had probably occupied this position most of the time, and when it became filled with gas or other contents, caused the pain and discomfort from which the patient had so long suffered. The neck of the sac was situated almost exactly at McBurney's point and the inner side touched the edge of the rectus muscle; it was about seven-eighths inch in diameter and was surrounded by a firm ring of transversalis fascia.

I believe that the hernia was probably of traumatic origin, that a rent in the transversalis fascia was caused four years before at the polo accident, and that the hernial protrusion found its way through this shortly afterward, gradually making its way outward through the fibers of the external oblique muscle until its progress was finally checked by the strong layer of aponeurosis. It then enlarged in all directions until it formed a tumor of the size described. There were no adhesions between cecum and sac. The sac was entirely removed and the transversalis layer and peritoneum sutured by overlapping. The internal oblique muscle was then closed with interrupted sutures of kangaroo tendon; next the aponeurosis, and finally the skin.

The patient made an excellent recovery and left the hospital at the end of two weeks, and has been perfectly well ever since. He has had no return whatever of any of the old symptoms.

SURGERY OF THE ABDOMEN, EXCLUSIVE OF HERNIA.

By EDWARD MILTON FOOTE, A.M., M.D.

Sensation in the Abdominal Cavity. Ritter¹ has pursued his investigations in order to determine the sensitiveness of the abdominal organs, a subject which was discussed last year. It is obvious that such investigations upon animals must be pursued with the greatest caution lest false conclusions be drawn. Thus, if local anesthesia is employed, no matter whether cocaine or some substitute is used, any test of sensibility upon opening the abdominal cavity is comparatively worthless, for it has been shown that infiltration anesthesia has a general as well as a local effect. Another unreliable method is to anesthetize an animal and then allow it to wake up. If a positive test is obtained it has value, but if a negative test is obtained its value is doubtful. According to Ritter's experiences, in some instances the animal will preserve sensation, and in others, in which the conditions are apparently the same, it will fail to do so. Even if one makes a test without a narcotic or anesthetic, the results are questionable. In such instances there may develop spasms from pain so severe as to make any test unreliable, and, moreover, the experiment is in the highest degree inhuman. Ritter believes that the most reliable tests are made by giving 0.1 to 1 c.c. of a 4 per cent. solution of morphine. This will put the animal to sleep, but so lightly that he rouses at the slightest touch. If under such circumstances a laparotomy is quickly performed, and a loop of the intestine is brought out and quickly wrapped in a warm saline compress, the animal becomes quiet in a short time, so that the most delicate tests may be performed. Under these conditions rough handling of the intestine, cutting, crushing, etc., produce an immediate reaction so clear that it cannot be misunderstood. The animal draws together as soon as the intestine is pricked; cries, whimpers, or raises its head and wants to jump from the table, so that one cannot doubt the sensation. All this manipulation is made without the slightest pull upon the mesentery or any compression of the parietal peritoneum. When cold is applied to the intestine in the form of cold solutions, pieces of ice, or ethyl chloride, no reaction is produced. Touching the intestine with a thermocautery produces intense pain. This does not follow when the liver is touched, even though the thermocautery is pressed deep into its substance. An

¹ Zentralblatt f. Chirurgie, 1909, Beilage, p. 57.

electric current applied to the intestine or to other organs produces a marked reaction. Another method of testing the sensibility is by the ligation of a vessel. This invariably produces symptoms of intense pain. It makes no difference whether the bloodvessel belongs to the stomach, intestine, or omentum. It may even belong to one of the organs which do not exhibit pain by the other methods of investigation, such as the spleen, liver, gall-bladder or pancreas. The cystic artery and the portal vein are both very sensitive. Thus, it may be stated absolutely that practically all the organs of the abdomen possess nerves of sensation. This has been demonstrated in the cases of animals, and Ritter was also able to demonstrate it in six human beings. Why is it then that a surgeon can perform laparotomy with a local anesthetic without pain? In the first place, when an intestinal loop is brought out of the abdominal cavity it begins almost immediately to lose its sensibility. The greater the portion of intestine thus exposed the more complete and prompt is the loss of sensibility. The practical point from these studies is that, in performing laparotomy under the influence of a local anesthetic, injection should be made into the mesentery whenever it is necessary to ligate and resect portions of the intestine. In this way, shock will be much reduced.

Nystroem,¹ whose technique and results differ materially from those of Ritter, points out that Ritter's six instances of sensitiveness observed in abdominal organs in man all had to do with portions of the viscera which were well supplied with blood. As most of the previous investigations in man have been made upon portions of the viscera which were poorly supplied with blood, it is possible that the differences reported in sensation of pain may be explained on this basis. Nystroem also points out that an animal which is sufficiently out of ether to be sensitive to the cutting of the parietal peritoneum may make absolutely no response to pinching or tearing of the small intestine. He performed a similar test upon a man upon whom he was operating for hernia. The sack was opened and its neck divided under a very light anesthetic. A loop of small intestine presented in the opening. The edges of the wound were temporarily held together so that the intestine should not be exposed to the air. The patient was allowed to regain consciousness; pinching his parietal peritoneum was painful. He was totally unaware when his small intestine was pinched, so long as the mesentery was not pulled upon. In the light of this contrary testimony it will be well for operators who have an opportunity to make similar tests, to do so, and to record the results of their tests made upon different portions of the alimentary canal and other organs.

Propping² repeated Ritter's experiments with morphine narcosis on four dogs. The first one received, unintentionally, a rather large

¹ Mitt. aus den Grenzgebieten der Med. und Chir., vol. xxi, p. 125.

² Beiträge zur klinischen Chirurgie, vol. lxiii, p. 690.

dose of morphine. Although he reacted to loud noises and slightly to jarring of the table, his visceral peritoneum was completely anesthetic. After a lapse of a few hours the abdominal cavity was reopened and the small intestine and its mesentery were again tested. It was found that portions which were free from bloodvessels were free from sensation or pain, while clamping or ligation of bloodvessels invariably produced evidence of pain. The test was repeated with three other dogs, always with the same result.

Lennander's principles that all organs which are supplied with sympathetic nerves are painless is rejected by Propping on the ground that the same nerves supply the mesentery, and the intestine itself. It is, therefore, difficult to see how one can have sensations of pain and not the other. He believes that the sensation of pain is due to the presence in the sympathetic nerves of a certain number of fibres from the central nervous system. If then, the disturbance of an abdominal organ is sufficiently great, a sense of pain may be experienced. He believes this to be the true explanation of colic occurring in the stomach, intestine, biliary passages, ureter, bladder, or uterus. Lennander explains colic as due either to pressure against the parietal peritoneum or else to a pull upon the mesentery of the affected organ. The first explanation carries little weight, since direct pressure upon the parietal peritoneum, far greater than could be produced in cases of colic, gives only a slight discomfort. It is difficult to believe that contraction of perfectly free intestine can exert traction upon its own mesentery sufficient to produce the pain of severe colic. However, whether Lennander's theories are correct or not, he deserves much credit for having emphasized the fact that serious changes may go on within the abdominal cavity without the production of much pain, and that, therefore, one should not always delay operation until the symptom of pain is present.

The Hemophiliac as a Surgical Patient. Any surgeon may have the misfortune to operate upon a hemophiliac. These patients rarely think to mention their peculiarity, and how many surgeons inquire into the possibility of its existence as a routine measure before operating? It used to be thought that the female sex is comparatively free from this weakness, but this opinion is disproved by the experience of Gimbal¹ and others. Gimbal lost one female patient and nearly lost another from postoperative hemorrhage due to a hemorrhagic diathesis. The mother of a third (male) patient was also a bleeder. Frankel and Böhm² have found reported in literature 104 cases of hemophilia in operations upon the genital organs of females, but the fatality in these cases seems much less than the fatality from hemorrhage after wounds in other parts of the body. Still, there were 24 deaths

¹ Arch. Provinc. de Chirurgie, 1909, vol. xviii, p. 584.

² Monatsschrift f. Geburtshülff u. Gyn., 1909, vol. xxx, p. 417.

in the 104 cases. The cause of true hemophilia is still unknown. In this article postoperative hemorrhage due to renal or hepatic lesions, anemia, purpura, infectious diseases, or to any form of infection in a wound is left out of consideration. In the cases of true hemophilia, no lesion sufficient to account for the symptoms can be found. There is a delay in the coagulation of the blood. Instead of coagulating in from three to five minutes as it should, it does not coagulate for a much longer period—fifteen minutes to nine hours.

Laboratory tests have succeeded in dividing cases of hemophilia into two classes—accidental cases and hereditary cases. In the former, although the coagulation of the blood is delayed, it occurs in from fifteen to forty-five minutes. It is favored by the administration of small doses of calcium chloride, and it is rendered absolutely normal by the subcutaneous or intravenous injection of human blood serum or the serum of certain animals. In the hereditary cases, coagulation of the blood is delayed still longer, occurring in from two and one-half to nine hours. It is favored by the injection of serum, but even then it remains abnormal in time and character.

The various remedies successfully used to control hemorrhage in normal individuals have little effect in a true hemophiliac. Pressure, tamponade, gravity, heat and cold, and the various styptics have been repeatedly employed without success. Even adrenalin has little power to check hemorrhage in these cases. Gimbal mentions a fatal hemorrhage following the removal of an intraligamentous cyst. The operation was easily performed. When symptoms of internal hemorrhage developed the abdomen was reopened. It contained a quantity of fluid blood; no ligature had slipped; no bleeding point could be detected. The blood oozed from the cut surfaces and continued to do so in spite of a fine continuous suture; nor was it stopped by tamponade or chloride of iron. Artificial serum was injected, but the girl, aged twenty years, died twenty-four hours after the operation.

Gelatin has some power to increase the coagulability of blood. It has been successfully employed in three ways: A patient may drink or receive into the rectum daily six or eight fluidounces of serum containing 5 per cent. of gelatin; an artificial serum containing 5 per cent. of gelatin may be injected subcutaneously; or compresses soaked with such a serum may be applied to the wound. Good results have followed the use of gelatin in all of these ways.

A hemophiliac is a bad surgical risk and should not be operated upon except in case of necessity. An injection of horse serum, freshly obtained, if possible, should be made subcutaneously twenty-four hours before operation. The skin over the jugular vein of a horse is sterilized and the vein punctured with a trocar. Fifty c.c. of blood is drawn into a sterile glass and allowed to coagulate. From this 10 or 20 c.c. is readily obtained for injection. An increase in the

coagulability of the blood is noticed almost immediately after the injection, and lasts for some days. If fresh horse serum is not obtainable, a prepared antitoxic serum may be employed. If there has been a great loss of blood, it is well to give a saline transfusion in addition to the serum injection.

Reduction of Postoperative Mortality. Tuffier and De Rouville,¹ in considering the preventable causes of death following operation, believe that the number of cases of delayed intoxication from the anesthetic could be much reduced if the patient were more thoroughly examined beforehand. The action of the liver and kidneys should be studied with as great care as that of the heart. In every case the urine should be analyzed in such a manner as to show the existence of hepatic insufficiency, and in every case test for acetone in the urine should be made. These tests will greatly assist in determining the prognosis of operation. There is some reason to believe that the practice of starving a person before giving an anesthetic is dangerous, and that in the days immediately before the operation, the patient ought to take as great quantities of carbohydrates as possible in order to store up in his liver an excess of glycogen and suppress the tendency to acidosis. A few hours before the anesthetic is administered, the patient should have nourishment which is easily digested and quickly absorbed, such as a starchy gruel with the addition of pancreatin. If symptoms of intoxication from chloroform develop, the free administration of glucose by the mouth, the rectum, and even by intravenous injection, has been recommended. In some cases, the administration of large doses of sodium bicarbonate has seemed beneficial, and the inhalation of oxygen is also recommended.

If one examines the causes of death in a long series of operations, it is shown that septicemia is almost always present. Many experiments have been carried out with the hope of finding some method of immunization or vaccination to reduce the possibility of operative infection to a minimum. Thus far they have failed and probably can never be realized because of the variety of germs capable of producing infection. If, however, it is impossible to immunize a patient, it is quite possible to increase his resistance. Can this be done by bringing him into a state of hyperleukocytosis? It has been accomplished in animals, Loewy and Richter having thus protected animals against the pneumococcus. Myake has shown that nucleinic acid, in the strength of 1 or 2 per cent., is capable of producing a hyperleukocytosis in the peritoneal exudate; so that this fluid possesses a bactericidal power seven or eight times greater than normal, about eight hours after the injection is made. In the blood, there is at first a hypo-, later a hyperleukocytosis, the maximum being reached in from six to

¹ *Rev. de Chirurgie*, 1909, vol. xl, p. 772.

ten hours after injection. Horse serum is another fluid which has a similar power. It is too early to say whether the same results can be produced in man, but the outlook is favorable.

Besides this general leukoprophylaxis, a local leukocytosis may be provoked in the peritoneal cavity. It has been estimated that the injection into the peritoneal cavity of horse serum, warmed to 55° C. for ten hours to reduce its toxicity, will so stimulate the peritoneum that on the following day it will have from five to eight times the normal power of preventing infection. However, the prevention of septicemia is by no means sure, since death followed in 21 per cent. of fifty-three patients who received preventive injections previous to laparotomy.

Another method of local prophylaxis consists in leaving in the peritoneal cavity after operation a fluid capable of increasing its resistance. Tuffier left 10 c.c. of sodium nucleinate in the abdomen of three patients upon whom he performed extensive gastric or intestinal resection for cancer. All recovered, but the number is not sufficiently large to render possible any positive statement as to the beneficial effects of the sodium nucleinate. The good effects of the introduction of oxygen within the peritoneal cavity were referred to on page 75 of the June, 1909, number of *PROGRESSIVE MEDICINE*. Numerous chemicals have been employed with the idea of destroying the germs which have entered during the operation. In the light of our present knowledge it is far better to attempt to aid nature in disposing of them than to introduce germicidal substances into the body.

Cannon and Murphy determined, by numerous experiments upon cats, that etherization, exposure of the stomach and intestines to the air, or to cool normal salt solution, only slightly delayed their normal movements. They then tested the effect of gentle handling under normal salt solution, gentle handling within the peritoneal cavity, gentle handling in the air, and severe handling in the air. Under normal circumstances food from the stomach was found to reach the large intestine in two or three hours. Gentle handling within the peritoneal cavity, or when the stomach and intestines were covered with normal saline solution, delayed the action of the stomach so that no food left it for three hours and its progress along the small intestine was very slow. Gentle handling in air delayed the action still more, so that in one case no food had reached the large intestine in twenty-six hours. From this it will be seen that long exposure of the intestines to the air and unnecessary manipulation of any sort are especially injurious, as tending to produce intestinal inactivity and tympany.

Treatment of Peritonitis. In the German Surgical Congress, both Noetzel¹ and Nordmann² read papers upon the surgical treatment of diffuse suppurative peritonitis. Heineke read a paper on the use of intravenous injection of adrenalin and normal saline. These papers

¹ Zentralblatt f. Chirurgie, 1909, Beilage, p. 61.

² Ibid., p. 67.

and the extensive discussion which followed them give a good idea of the present attitude of European surgeons toward this most difficult problem of abdominal surgery. A full review is therefore interesting. In *PROGRESSIVE MEDICINE* of June, 1908, I pointed out that more and more attention is being given, in the surgical treatment of pathological changes in the abdomen, to the conditions under which the abdominal organs normally perform their functions. In brief, we are coming into an era of physiological surgery. This fact is clearly shown in these papers and in the discussions which followed their presentation. Only as the surgeon observes the normal conditions within the abdomen and strives to create them as far as possible by his operation can he expect the best results in abdominal surgery. How can he possibly aid abdominal function if he produces conditions far removed from the normal and which are perhaps even farther removed than the pathological conditions for which his operation is performed?

Noetzel pointed out that *operative treatment of diffuse suppurative peritonitis* rests on the fact that a serous membrane is more resistant to suppuration than other tissues. It possesses this resistance by reason of its epithelial cells which have an especial power of destroying bacteria. This is entirely separate from the mechanical action of an outward flow of secretion from the wound, a favoring factor which abdominal wounds possess in common with all other wounds of the body. Thus, the patient recovers from peritonitis if the pus is evacuated and its further escape is provided for by correct drainage. Operation for peritonitis should accomplish three things: (1) Radical removal of the cause, (2) as far as possible, the removal of accumulated pus; (3) as far as possible, drainage of the abdominal cavity and any associated abscesses or collections of pus.

From time to time, emphasis is placed on one or the other of these three objects. At first it was the removal of the pus. Just at present there is a tendency to emphasize the removal of the cause and to slight the removal of the pus. While not a few surgeons spurn drainage altogether, Noetzel believes that all three factors are essential, just as they are in ordinary abscesses. The fact that they can be only imperfectly carried out in the abdomen is no reason for slighting them.

The removal of the cause is in many cases the first act of the operation. Its technique varies according to the organ operated upon.

The removal of existing pus has divided surgeons into two classes: Those who attempt this by sponging, and those who believe in irrigation. There is no doubt that a more thorough cleansing with less injury to the intestine is obtained by irrigation with large quantities of fluid. Those who object to irrigation usually place all emphasis upon the removal of the cause of the peritonitis, trusting that the natural resistance of the peritoneal cavity will attend to any pus which is left behind. Yet every operator should strive to aid the natural resistance

of the part by every means in his power. Others reject irrigation as dangerous, stating that by its means the agents of infection are spread widely throughout a peritoneal cavity. Nordmann's experience has convinced him that this fear is groundless, provided the irrigation is properly carried out. One should never allow the fluid to escape into the abdominal cavity under any considerable pressure. If the whole cavity is to be irrigated, a counteropening with a drain should be in place before the irrigation is begun. If a limited portion is irrigated, the wound should be held open so that the fluid may thoroughly escape. In no case should irrigation be carried out when the patient is lying with elevated pelvis. Indeed, this position should be avoided during and after operations for peritonitis, and, if the nature of the case makes it imperative, the irrigation should first be carried out, and the upper portion of the abdominal cavity protected by compresses before the pelvis is elevated. The value of hot irrigations is shown in its good effect upon the heart, its tonic influence upon the intestine, and the hyperemia of the peritoneum which it produces. Eventration should be avoided as far as possible. While it is admitted that slight and beginning cases of peritonitis can be brought to recovery without irrigation, in severe and extensive cases irrigation offers distinct advantages. This, however, is a question which can only be settled by the results in large numbers of cases, and hitherto such figures have not been furnished by the advocates of the dry method of treatment.

Drainage and the care of the laparotomy wound has been variously carried out. The method of Rehn seems constantly to be gaining in favor. He introduces a tubular drain to the lowest point of the pelvis and closes the abdominal wound by suture close around this tube. This reproduces approximately normal intra-abdominal pressure, so that fluid left in the abdominal cavity naturally sinks to the pelvis and is pressed out of the drain. Leaving an abdominal wound open is based upon a false conception, since it hinders rather than favors the escape of fluid, by producing abnormal conditions of pressure and interfering with the circulation, absorption, and peristalsis. This is especially true when tampons are employed. One cannot tampon the whole infected cavity, and capillary drainage is promptly stopped by the adhesions which quickly form around the tampon. For this reason strips of gauze should not be substituted for the tubular drain. The after treatment begins with the inclined position of the patient, the shoulders being elevated and the pelvis depressed. The drain should not be removed for a number of days, even if all goes well. In cases of extensive peritonitis, there is a discharge of infectious material from the abdominal cavity for several days, so that the drain should not be removed until the discharge has become so slight that it may reasonably be attributed to irritation of the granulations surrounding

the drain. On the second day after operation the drain should be rotated and daily thereafter until it is removed.

Distention of the intestine with gas acts injuriously by pressing upon the heart and lungs, and also by favoring the resorption of poisonous intestinal contents. If such an intestine could be emptied it would be of the greatest benefit to the patient. Enterostomy, while of value when only a limited portion of the intestine is paralyzed, is useless when the paralysis involves the whole intestine. The peritoneal infection must be overcome before the intestinal paralysis disappears. All the means which we possess of increasing peristalsis are serviceable only in case the intestine is not paralyzed. They may, however, serve to prevent complete paralysis if used in time. Washing out the stomach, if employed early, is often of great benefit. It should be repeated until the stomach is able to empty itself. Saline solution injected into a vein acts more promptly and powerfully than subcutaneous injections. Neither one should be employed as routine treatment in peritonitis.

The following tables show the *mortality after operation* in the Frankfurt clinic from 1891 to the end of March, 1909. During this period every patient with peritonitis was operated upon. There is, therefore, no selection of cases involved.

Cause of peritonitis.	Number operated upon.	No. of deaths.	Per cent. of mortality.
Appendicitis	308	111	36
Pyosalpinx	61	19	31
Perforation of the stomach.	27	10	37
Intestinal perforation	19	14	74
Puerperal.	15	8	53
Perforation of the gall-bladder.	11	6	55
Perforation of the urinary bladder	4	2	50
Peritonitis due to pneumococcus	3	1	33
Fecal impaction	1	0	0

Tables were also presented showing the improvement in the statistics of patients with peritonitis from appendicitis; the mortality in 1900 was 60 per cent., and in 1909, 14 per cent., or taking three years together the mortality in 1900 to 1902 in 39 cases was about 56 per cent., whereas in 1907 to 1909 the mortality in 84 cases was about 18 per cent. As is well known, the mortality in diffuse peritonitis due to appendicitis is less than when the peritonitis is of other origin. It is difficult to say whether this is due to the fact that it is recognized earlier or is caused by less virulent germs, or whether the extent of the infection is overestimated by the operator. It has often been pointed out that the statistics of different operators are very misleading, because of the different conceptions of the term diffuse peritonitis. Many writers also fail to state the number of patients seen, but not operated upon. Nordmann himself presented a record of 75 patients, 69 of whom were operated upon; the other 6 promptly died without operation. Of the 69,

36 recovered, giving a mortality of 48 per cent. The mortality was 46 per cent. in appendicular cases; 50 per cent. in perforation of the gall-bladder; and 40 per cent. in perforation of the stomach. He included in his classification only those patients who presented marked symptoms of peritonitis and the physical signs of inflammation, or of fluid in the whole abdominal cavity. In the appendicular cases, there were 6 cases of dry peritoneal sepsis with great distention and intestinal paralysis. They all died. Bacteriologic examination gave the following results—*Bacterium coli* in pure culture: 17 cases with five deaths, equal to 30 per cent. One case of *bacterium coli* and streptococcus: one death, equal to 100 per cent. Six cases of *bacterium coli* and staphylococci; 2 deaths, equal to 33 per cent. Staphylococci alone in 3 cases, all fatal, equal to 100 per cent. One of these was a case of dry peritoneal sepsis. Streptococcus alone in two cases with one death equal to 50 per cent. Streptococcus and staphylococci mixed in two cases with no deaths. Diplococci in two cases, both of which were fatal. Nordmann believes that different bacteria are more common in different cities.

In making a *diagnosis*, contraction of the abdominal muscles is looked upon as the most important symptom of peritonitis, yet it may be misleading. In one of Nordmann's cases in which it was present, the abdomen was opened, but no peritonitis was found. The patient had typhoid fever, and the gall-bladder was infected with typhoid bacilli. In another case of mistaken diagnosis, the abdominal muscles were firmly contracted and the patient complained of unbearable abdominal pain; yet he proved to have a pleurisy which developed into empyema. A third mistake was made in a case of Addison's disease without discoloration of the skin. It is possible that the contraction of the muscles in these cases was due to the presence of toxic substances in the blood.

The *method of treatment* followed in this series of cases varied a good deal, so that one has an opportunity to compare the results of different methods carried out by the same man. In eight cases, the abdominal cavity was irrigated with saline solution and closed without drainage. Six patients recovered and two died. In one of the recoveries a stitch abscess developed. The two deaths occurred from collapse and the abdominal cavity was clean. It was too soon to say whether or not the peritonitis was checked. The *cause of peritonitis* in these eight cases was as follows: Perforated ulcer of the stomach, in 4 cases; suppurating Fallopian tube, in 2 cases; perforated carcinoma of the stomach, in 1 case; rupture of the bladder, in 1 case. In 26 cases, the abdominal cavity was irrigated with saline solution and closed around a drain—13 patients recovered and 13 died. The peritonitis originated in the appendix in 18 cases—11 recoveries and 7 deaths; and elsewhere in the abdomen in 8 cases—2 recoveries and 6 deaths. It is worth noting that in several cases of recovery there were stitch abscesses and often

a slough of considerable fascia. One patient died of sepsis due to the infected wound, in whom autopsy showed the peritoneal cavity to be perfectly clean.

In 35 cases *tamponade* and *drainage* was employed with 17 recoveries and 18 deaths. In 14 of these the peritonitis originated in the appendix—4 recoveries and 10 deaths; in these cases a single incision was made. Two incisions, right and left, were employed in 12 cases—10 recoveries and 2 deaths. Four or more incisions were employed in 8 cases—3 recoveries and 5 deaths. The drains varied; some were Mikulicz tampons and some were smooth rubber drains. The latter did the better service.

It is difficult to compare the results of these different methods not knowing upon what the choice of method was based. In Nordmann's opinion, the inflammation of the peritoneum was less extensive and less severe in the cases which were sutured without drainage than in the cases which were drained. He is firm in his opinion that gauze tampons in the abdominal cavity only work harm, and that after a thorough irrigation a small rubber drain from the pelvis is the most satisfactory one to employ. As might be expected, the majority of the recoveries occurred in the cases in which peritonitis had lasted less than two days at the time of operation. Nordmann considers enterostomy a useless procedure if there is complete intestinal paralysis. Neither did he see any benefit from physostigmine, even in large doses. Intravenous injection of normal saline solution and adrenalin he found to have no effect in sepsis; but in two cases it promptly overcame symptoms due to relaxation of the bloodvessels.

It is almost impossible to give a *prognosis* before the operation. It was noted, however, that patients with a pulse over 120 and a high temperature usually died. If the pulse was under 100, and respiration moderate, the patient usually recovered. Intestinal paralysis is also an unfavorable symptom. Patients with a free discharge from the wound usually recovered, while those from whom there was little or no discharge usually died.

Sprenkel¹ is not yet converted to *irrigation in the treatment of diffuse peritonitis*. He gets equally good results from employing the so-called dry method. He does not employ saline injections either subcutaneously or into a vein, looking upon large injections as distinctly dangerous. He has also given up the inclined posture, as well as enterostomy. In cases of appendicitis, he uses a drain to the pelvis, and if there is pus on the left side of the abdomen he also inserts a drain there.

Borchard,² at the close of an operation, injects 50 to 100 c.c. of sterile oil into the peritoneal cavity, claiming thereby to delay the absorption of toxins. He reported 45 cases with 12 deaths, a mortality of 27 per

¹ Zentralblatt f. Chirurgie, 1909, Beilage, p. 74.

² Ibid., p. 75.

cent. He no longer employs enterostomy. He believes that transportation of a patient suffering from peritonitis does less harm than delay in operation.

Alapy¹ employs adrenalin-saline solution as a rectal injection, but does not irrigate the peritoneal cavity when operating for peritonitis. If the patient does not improve, he performs enterostomy, opening any distended coil and leaving the intestinal fistula to be closed later. He does not believe in abdominal drainage.

Kotzenberg² reported 58 cases of diffuse peritonitis with 7 deaths, a mortality of 12 per cent. He irrigates with great thoroughness, leaves the abdomen full of saline solution, and inserts a glass drain with gauze in the centre.

Heineke³ treated some 12 to 15 patients having diffuse peritonitis with *intravenous injections of adrenalin*. In every case, there was a marked improvement in the pulse for a short time; but this disappeared in a few minutes and in one or two hours the effect had passed away. In a few patients, the increased pressure in the vessels continued and these patients recovered. The symptoms, however, were indistinguishable from those which follow an injection of normal saline solution. These results coincide exactly with the experiments upon animals. Adrenalin is well known to excite an increased tension in the blood-vessels, which lasts only a few minutes. This is equally true whether the animal is in a normal condition or has an acute peritonitis. The improvement in the arterial tension lasts somewhat longer when the adrenalin is given with a saline transfusion than it does when the adrenalin is given alone. Whatever permanent effects were noted should, therefore, be attributed to the saline solution rather than to the adrenalin.

In many cases of peritonitis, *saline transfusions* are most satisfactory in the improvement which they produce. In other cases they are equally disappointing. Probably in the first class of cases there has been great loss of fluid from the body as the result of vomiting, and the inability to take fluid, or loss through exudation into the peritoneal cavity, or through an intestinal fistula. If such is not the case and there is no deficit of fluid in the body, but the poor circulation is due to paralysis of the vasomotor centres, the benefit from saline transfusion is very slight or altogether absent, since the excess of water which is injected is speedily eliminated. The practical application of these discoveries is to employ adrenalin injections, not in peritonitis, but in collapse due to narcosis, in spinal anesthesia, in shock after extensive operations and injuries, in severe hemorrhages and perhaps in cases of poisoning, and in certain infectious diseases.

Further discussion of treatment and postoperative treatment in cases of peritonitis will be found under the heading "appendicitis"

¹ Zentralblatt f. Chirurgie, 1909, Beilage, p. 74.

² Ibid., p. 74.

³ Ibid., p. 72.

Brown¹ says that the good results following the *Fowler-Murphy treatment* are misinterpreted. When they are due to the gastric lavage, and abstinence from food and purgatives, he looks upon the temporary paralysis of the bowel as beneficial, and says that the upper healthy portion of the alimentary tract should be kept quiet until the inflamed part begins to inaugurate a favorable motion: in other words, when the bowels show a tendency to move it is a sign that the inflammation has subsided. But we should not reason from this that forcing the bowels to move will cure the inflammation. If we evacuate an abscess or remove an infected appendix, unless too great a supply of toxins has reached the general system, the patient will recover without drainage. The Fowler position is useful only when drainage is employed, and the 46 degrees of elevation often causes severe strain upon the heart.

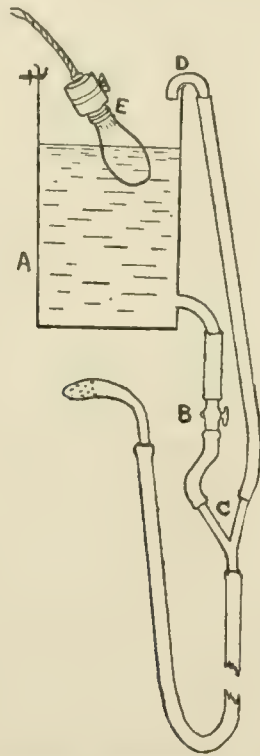


FIG. 17.—A, foundation syringe or irrigator; B, a stopcock; C, a Y-shaped glass tube. From this a long rubber tube extends ending in a hard rubber or glass tip for the rectum; and another piece running up to the U; D, V-shaped glass tube which projects into the irrigator; E, 8 candle power incandescent light keeps up temperature. Set the stopcock for a flow of from 50 to 80 drops a minute. The vent tube from C to D allows back flow of fluid or gas when the patient strains. The irrigator should be from 4 to 14 inches above the level of the buttocks.

Apparatus for Proctoclysis. A number of methods have been described for the administration of the Murphy treatment, or continuous flow of warm saline into the rectum. Some of the forms of apparatus which have been described are very ingenious, but most of them are rather complicated, or otherwise unsatisfactory. It is hard to imagine any-

¹ Surgery, Gynecology, and Obstetrics, 1909, vol. ix, p. 690.

thing simpler than a form of apparatus recommended by Iversen.¹ Its parts and manner of working are easily seen from the accompanying illustration (Fig. 17).

Subphrenic Abscess. Not since Maydl published his treatise on subphrenic abscesses, in 1894, has there been such an important study of it in all its phases as one recently published by Piquand in the *Revue de Chirurgie*, 1909, pages 156 *et seq.* Maydl's report was based on a study of 179 cases. In 1897, Finkelstein collected reports of an additional number basing his paper on 252 cases which he classified into eleven groups according to the origin of the abscess. This number of cases has not been exceeded by subsequent writers until now; Piquand collects reports of 890 cases which he divides into sixteen groups according to the origin or nature of the abscesses, as follows: From the stomach, 251 cases; from the duodenum, 36 cases; from the rest of the intestine, 20 cases; from the appendix, 191 cases; from the liver, 70 cases; from the biliary passages, 66 cases; from the pancreas, 27 cases; from the spleen, 40 cases; from the kidney, 28 cases; from the female genital organs, 17 cases; from thoracic disease, 32 cases; tuberculous, 23 cases; traumatic, 20 cases; of unknown origin, 69 cases. Classifying them anatomically, he finds that 497 abscesses were situated in the right subphrenic space, 324 in the left subphrenic space, 28 were bilateral, while the exact situation of 41 was not stated. The following bacteria were present in the order named: *Coli bacillus*, streptococci, staphylococci, pneumococci, Eberth's bacillus, pyo-organic bacillus, anærobic microorganisms. The presence of gas was noted in more than one-quarter of the cases. Three theories have been advanced to explain this. Some writers are of the opinion that it comes from the lungs, some believe that it comes from the intestine, and some think that it develops spontaneously. It seems probable that there may have been different causes for it in different cases.

As a subphrenic abscess is almost always secondary to a lesion in some organ, it follows that, in the majority of cases, there were well-marked symptoms for a considerable time before an abscess developed—such symptoms as one naturally expects with ulcer of the stomach, appendicitis, cholecystitis, abscess of the liver, etc. An anteroinferior abscess gives abdominal symptoms, notably pain and a sharply limited tumor, the situation of which varies according to the exact situation in which the abscess develops. The results of percussion vary according to the presence or absence of gas. An abscess developing high up and crowding the diaphragm and lung upward gives quite different symptoms. Respiration is rapid, and confined to the upper part of the chest, hiccough is often present and there is pain on pressure in the lower intercostal spaces. No tumor is noticeable, but the thoracic

¹ Journal of the American Medical Association, 1909, vol. lii, p. 1907.

stage is distended. If gas is present, the results of percussion and auscultation resemble those of pneumothorax. If there is no gas, pleurisy with effusion is simulated. Retroperitoneal abscesses are marked by signs of suppuration in the right lumbar region where there is swelling and pain on pressure. These abscesses usually come from the appendix. In all cases there is fever, with a rapid rise and fall of temperature, the patient looks sick and quickly becomes emaciated. Examination of the blood shows a decrease in hemoglobin of about 5 per cent. and a marked increase in white blood cells and in the polynuclear cells.

It is manifestly impossible, in the limited space allowed me, to give a complete review of this valuable contribution to surgical literature. Passing over the complications which may arise and which are as varied as the organs from which the abscess comes, it may be noted that the *mortality* was high whatever the form of treatment adopted. In the patients who were not operated upon, it was over 90 per cent. In those who were operated upon, it was 48 per cent. according to Maydl, 1894, 44 per cent. according to Finkelstein, 1897, and 30 per cent. in Piquand's list. The form of *treatment* recommended by most writers consists in free drainage. This is a simple matter in an old abscess lying near the surface; but is often difficult in the earlier stages of an abscess, at which time treatment is most important. Piquand discussed at length the *situation of the pus* in abscesses developing from the various sources enumerated. Most interesting are the abscesses which follow appendicitis. Four theories have been advanced to explain the extension of the infection in these cases, as follows: (1) By the portal vein; (2) by the lymphatics; (3) by the cellular tissues; (4) by the peritoneal cavity. There seems little reason to doubt that abscesses are formed in at least three of these ways—infection by the peritoneal route producing an intraperitoneal abscess, infection by the cellular tissues producing a retroperitoneal abscess, and infection by the lymphatics producing either of these types. Appendicular abscesses are almost always situated to the right of the median line. The mortality in these cases of appendical origin has been 33 per cent.; markedly less than this if the patient has been operated on in less than three weeks after the formation of the abscess. The percentage of mortality has been about the same whether the incision was in front, or in the lumbar region, or transpleurally, after resection of a rib.

TALMA OPERATION. Warrington¹ states that the indication for this operation must be based on precise pathological knowledge. It is of great interest to note that laparotomy, in cases of cirrhosis with ascites, is often followed by terminal symptoms of a nervous toxemia. The author regards it as of more than passing import that, whereas in tuber-

¹ Liverpool Medical and Chirurgical Journal, 1909, No. 56.

culous peritonitis the ascites is cured, according to Wright, by a renewal of the opsonic content of the blood in the abdomen, in cirrhosis, it appears that a disturbance of the balance of the abdominal circulation seems in some mysterious manner to reduce the already greatly impaired hepatic activity and precipitate the latent toxemia. He concludes, that the operation in uncomplicated cirrhosis is rarely indicated; that in chronic cirrhosis, operation is dependent largely upon the condition of the other abdominal viscera. If these are reasonably healthy, the operation may be attempted with a view of obliterating the peritoneal cavity by adhesions. In the mixed form of cirrhosis, there may occasionally be a balance of argument in favor of the operation.

The Disappearance of Peritoneal Adhesions. Uyeno,¹ who has studied the production of peritoneal adhesions in animals and has tested the influence of different forms of treatment upon them, makes some interesting observations upon this subject. In experimenting with rabbits, he found that when the peritoneum was touched with iodine it was covered with fibrin within twenty-four hours, and within forty-eight hours the fibrin was filled with leukocytes. The growth of fixed cells in the fibrin was observable by the third day. The adhesion was converted into well-formed connective tissue by the tenth day. He observed that adhesions formed in this way were never permanent, unless the injured portions of the peritoneum were held in contact by sutures or otherwise. When this was done scar formation went on more rapidly so that fibroblasts were observable in seven days and the proliferation of cells reached its maximum in fourteen days. After that, atrophy began. It is well known that attempts to prevent the formation of adhesions by applications of oils, gums, gelatin, etc., to the injured peritoneum, or the separation of the injured surfaces by means of gold-beater's skin or other animal membranes have failed to give freedom from adhesions. Attempts to prevent adhesions by inducing an early and violent peristalsis by the use of physostigmine have not been very successful. Uyeno tried this in eleven rabbits without any result. More encouraging results were obtained by massage of the abdomen for twenty or thirty minutes at a time. The various forms of massage—stroking, kneading, rubbing, and manipulation, were made use of. In every case the existence of strong adhesions was demonstrated by second laparotomy, at which time the sutures holding the peritoneal surfaces together were removed. The second laparotomy was usually performed in two weeks, and massage begun one week later. In eight cases, this method of treatment was thoroughly carried out for periods varying from seven to sixty days. Massage was not performed every day, but it averaged almost every second day. The results showed

¹ Beiträge zur klin. Chirurgie, 1909, vol. lxx, p. 277.

four partial separations of the adhesions, one almost complete separation and three complete separations. The experimenter looked upon these results as positively due to the massage, since his former experiments showed him that adhesions having the character of those with which he was dealing would have become very firm in these periods of time. Just how far these results are applicable to man, he has no means of saying. It stands to reason that the underlying principle is as true in one case as the other. Long ago, Thure Brandt demonstrated the effectiveness of massage in freeing the uterus from pelvic adhesions when performed daily for a long period of time.

Uyeno¹ also conducted a series of experiments with dogs in order to determine the *influence of opium and physostigmine upon intestinal sutures*. He concluded that these two drugs are capable of producing very strong effects after intestinal suture. The paralyzing effect of the opium favors the development of connective tissue about the cut end of the bowel, while physostigmine acts to prevent this. Even the regenerative activity of the epithelium of the intestine was favored by opium and delayed by physostigmine. The influence of these two drugs upon the formation of adhesions was insignificant. This corresponds with Uyeno's conclusions after his experiments upon rabbits with physostigmine. This drug used in large doses after an intestinal suture is not without danger. Two dogs died from peritonitis. The nine which survived and were killed for examination in from one to four weeks were badly emaciated—partly as the result of violent diarrhea but partly, in the opinion of the experimenter, as the result of the poisonous action of the physostigmine. It is true that he employed the drug in doses greater than that usually employed in man, giving 2 to 3 mgm. ($\frac{1}{20}$ grain) subcutaneously from two to twenty times a day.

Cosmetic Effect of a Laparotomy. Weinhold² believes that too little attention is paid to the appearance of the abdomen when laparotomy is performed. He asserts that in many stout persons, besides performing the necessary operation within the abdomen, the surgeon should improve the external appearance by the removal of masses of skin and fat. Weinhold has done this in several instances, in one case taking away eleven and one-half pounds. His patients wore a firm bandage for a year after such a plastic operation.

This is a subject that may well be considered by surgeons. Most operators try to make their scars as inconspicuous as possible, and they are often able in a subsequent laparotomy to remove scars of previous operations. Efforts at beautification have seldom been carried farther than this. Usually, the unduly stout person is not a welcome subject for laparotomy. If, however, the surgeon is able to gain her gratitude by restoring something of her original form, his work will have an added interest to himself and to his patient.

¹ Loc. cit., p. 106.

² Zentralblatt f. Gynäkologie, 1909, vol. xxxiii, p. 1332.

Those who are interested in this subject will find in Coffey's¹ article on *Plastic Surgery of the Abdominal Wall* a decided help in its practice. He has studied the fascial planes of the abdominal wall and makes extremely ingenious suggestions as to what can be accomplished with them to tighten a lax abdominal wall and loosen one in which there is not enough material at hand to properly close a ventral hernia. For example, in a case of pendulous abdomen without distinct hernia, he split the fascia of the external oblique on each side parallel to its fibers, dissected it free from the internal oblique for some distance and as far down as the symphysis, and then overlapped and sutured the reduplication, making on each side of the abdomen an ellipse of overlapped fascia extending from the anterior superior iliac spine to the symphysis. The result was an abdominal supporter made of the patient's own tissues.

THE STOMACH.

Gastric Dilatation and Acute Intestinal Obstruction. Throughout the medical journals of the past few months, there are found an unusual number of articles bearing upon the important subject of acute intestinal obstruction. Certain of these, namely, the studies by Maury² from the Surgical Research Laboratory at Columbia, and Frouin,³ *Contribution Experimentale a la Chirurgie de l'Estomac*, report the findings of experimental lesions in animals, while others, such as MacArthur,⁴ and Hartley,⁵ approach the subject from a purely clinical standpoint. It is of interest to note that in approaching this vexed question from different standpoints, the authors seem to have brought their labors to the same definite conclusions. For it must be granted that too much light cannot be shed upon this difficult problem and every ray possible should be focussed upon it from every available source. It is most significant that through parallel but very different steps, different premises should yield like conclusions as a result of clinical and experimental studies. It has been said, by the opponents of vivisection, that the interpretation of animal findings in terms of human ailments is valueless. No better refutation of this foolish idea could be had than that afforded by the parallelism of MacArthur's and Maury's results.

As to the indications for treatment, there has been no change in the opinion that it is expedient to get rid of the accumulated material in the proximal portion of the gut. Methods of drainage have been

¹ Surgery, Gynecology, and Obstetrics, 1910, vol. x, p. 90

² American Journal of the Medical Sciences, 1909, vol. cxxxvii, p. 725, and Journal of the American Medical Association, 1910, vol. liv, p. 5.

³ Press Med. Par., 1909, vol. xviii, pp. 441, 444.

⁴ Journal of the American Medical Association, 1910, vol. liv, p. 1.

⁵ British Medical Journal, 1909, vol. ii, p. 1463.

proposed, designed to supercede the Monks' technique and the Paul tubes. Perhaps one of the cleverest of these is that of Mamourian,¹ who connects the aboral portion of the distended loop with a piece of soft rubber tubing about a yard long by means of a Murphy button. This technique is certainly most ingenious and its originator is entitled to all commendation, for, as he says, as many tubes may be connected as necessary and the intestines may be "milked" or not, at will. This at once suggests the views of Cannon, who, in commenting on the skill and ingenuity of certain of his surgical colleagues, said that their cunning was so great that so far as the present well-being of the patient was concerned, if not the future, they were able to operate upon the human intestines as though they were inanimate pieces of rubber tubing rather than highly developed and very specialized organs. The term "milking" suggests one of the most important problems in connection with this whole matter, viz., the advisability of reducing the intra- and interenteric pressure. It cannot be denied that in no department of therapeutics is there evidenced greater need for a scrupulous and first-hand interpretation of the healing power of nature than in the study of acute obstruction. From the clinic at Rochester comes the assurance that no intra-abdominal condition is approached by the Mayos with greater misgivings than that of acute intestinal obstruction; and the acknowledged reason for this is that the efforts which nature makes to overcome intoxication, of whatever nature this may be, are as yet but little understood. The chiefs of this clinic realize that for the present in treating obstruction every therapeutic measure must be empirical. What can be expected from surgery not based upon an effort to aid nature's efforts to cure? Whatever grounds there may be for believing that the singularly rapid and depressing symptoms attendant upon acute intestinal obstruction may or may not be, the result of an interference with normal metabolic changes occurring in the intestines, particularly in the duodenum, recent literature makes it quite plain that a rational interpretation of each specific symptom must be made before real progress can be looked for. It is well known that dogs will frequently die from duodenal obstruction without revealing at autopsy much, if any, dilatation of the oral intestine. There are those who believe that the abdominal distention, as well as the enteric, may have some interpretable relation to the conservation efforts of nature. If this be so, and the pressure were at some future date shown to have an important relation to the lymphatic drainage, there would at once be a parallel suggested to Bier's hyperemic treatment of the extremities.

Reviewing, more in detail, the experimental and clinical studies already referred to, it may be noted that MacArthur performed irriga-

¹ British Medical Journal, 1909, vol. ii, p. 1466.

tion of the duodenum from the region of the biliary papilla through the pylorus by attaching the gall-bladder to the surface and washing normal salt solution into the duodenum, after the well-known method of irrigating the colon through the appendix. From a physiological standpoint, it is most interesting to note that in man, as well as in dogs, this procedure is not in any way interfered with by the pyloric sphincter, nor does it seem to matter whether this retrograde washing be carried out with an alkaline or an acid medium. MacArthur has found that this duodenal irrigation, the fluids of which pass easily out of the mouth through an ordinary stomach tube, exerts a most beneficent affect upon all patients who have been operated upon for any hepatic lesions. One cannot read the papers of MacArthur and Maury, which fortunately have been published in the same number, without being forcefully reminded of the close relationship of the lower vertebrate pathology to our own. Further, one may be justified in feeling that these co-ordinated human and animal studies have added weight to the suggestion that death in intestinal obstruction or acute gastric dilatation, as well as the too frequent death following operations upon the biliary system, may have a common origin, for it can hardly be supposed that the recently described anërobic bacillus, which has been found resident in a large proportion of normal livers, can be held responsible for these postoperative deaths, particularly in view of MacArthur's good results from duodenal irrigation. Further information regarding this anërobe will be looked forward to.

Results of Gastro-enterostomy. Paterson¹ reports a most interesting case in which the gastric contents as well as fluid escaping from a jejunal fistula, were carefully studied. The summary to this important paper was as follows: The risk of ulcer after gastrojejunostomy and in the presence of good technique should be less than 2 per cent. Jejunal ulcers are sometimes of infective origin. If so, they usually occur soon after operation and are generally multiple. The single ulcer, which is not infrequent, is probably the result of toxic action of hydrochloric acid and possibly other agents. Finally, there has been no instance of jejunal ulcer reported since the introduction of the no-loop operation. There is an interesting suggestion in these conclusions, and it is contained in the statement that possibly "other agents," in addition to or separate from the hydrochloric acid, may play a part in causing ulceration of the jejunum. It has been known for some time that occlusions of the duodenum in dogs would almost invariably result in the production of phagedenic and fulminating ulceration of the gut throughout the length of the occlusion. It is noteworthy that this ulceration begins always at a point 180 degrees from the mesentery or at a point of minimal circulation, and occurs

¹ Proc. Royal Society Med., vol. ii, No. 8.

quite independently of hydrochloric acid. It would appear, therefore, reasoning from animals to man once more, that the author of this paper believes that the ulceration of the bowel is due to other agents than hydrochloric acid. Bolton, in discussing this paper, said that his experimental researches showed that while ulceration of the stomach might be produced by hyperacidity of the gastric juice, it did not prevent healing of the ulcer, provided that the body health were normal and the stomach emptied itself in normal time. He had determined positively that alteration of the acidity of the gastric secretion was not sufficient for the production of chronic ulcer. Pyloric constriction, however, would frequently cause delay in healing. He had been able to demonstrate this in a cat. In guinea-pigs, ulcers did not produce hyperacidity, but, on the contrary, they lowered the acid content of the gastric juice. Nor was this due to neutralization brought about by the sloughing of the ulcer, for the inorganic chlorides were not increased. He held—and this is of particular interest to those who believe hyperacidity to be an accompaniment rather than a causative factor in the ulceration of the alimentary mucosa—that hyperacidity was a form of functional disease complicating ulcer, and that it might take part in its production.

Bishop¹ has neither seen nor heard of any vicious circle vomitings after no-loop posterior operations. He calls attention to a means of recognizing the first seven or eight inches of jejunum—this coil looks as if it were “sodden;” it has not the polished surface of the rest of the small gut and is covered by many small eminences, looking “moulded,” as if the gut contained putty and had been irregularly compressed. Leonard Bidwell, in the discussion of this paper, regarded the escape of stomach contents as a bugbear which he no longer dreaded. He considered it necessary to occlude the pylorus, particularly in duodenal ulcer, and voiced what appears to be the opinion of many today that gastroenterostomy in the presence of an open pylorus was not only hazardous, but extremely ill advised. He called attention to the fact that it had long been known that all stitches put into the gut, unless absorbed, were finally extravasated into the lumen, and, therefore, any puckering or stitching operation upon the pylorus would serve to occlude it for a short time only.

Whatever may be the physiological reason for the absence of vomiting after the so-called no-loop operation, it is singular that, in the studies of Cannon and Leggett, the position of the “stoma” appears to have no demonstrable effect upon the course of food after these operations. The former experimenter studied the digestive currents by means of a fluoroscope, and the latter by attaching a shot to a piece of string which was tied in the pharynx. The relationship of these experimental

¹ Proc. Royal Society of Medicine, vol. ii, No. 9.

studies to the reported advantages observed in man from the use of the no-loop operation suggests, if it does not demonstrate, that there may be something more than the mere mechanical improvement in the drainage of the loop, for it is not many years since the best operators were endeavoring to drain the stomach by placing the stoma at the most dependent part. Cannon's studies have shown that, except in paralyzed organs, there is probably no such thing as drainage. Possibly the same may be true of the intestinal loop, and that the postoperative improvement noted is not due so much to better drainage in the no-loop operation as to a minimization of the disturbance in the normal physiological function of a very delicate mechanism.

Experimentally in dogs under ether anesthesia it has been shown, both by Cannon and Murphy¹ and by Leggett and Maury, that in more than half of the cases of gastro-enterostomy, in which the pylorus has been left intact, no food whatever passes on into the small intestine through the stoma. By use of the *x*-ray, bismuthized food was shown by Cannon to follow the normal peristaltic wave of the pyloric portion of the stomach, and to pass through the pylorus into the duodenum. Maury and Leggett, by an ingenious series of experiments, reached the same conclusion. They attached a B.B. shot to one end of a string, the other end of which was ultimately tied into the retropharyngeal region. With the aid of a probang, the shot was passed into the stomach of an etherized dog, upon which, ten days or two weeks previously, a gastro-enterostomy had been done. The stoma was purposely placed in different positions by these experimenters in order to determine, if possible, whether this had any influence on the course of the gastro-enteric current. The string and bullet were left in situ for forty-eight hours and then the animal was killed with ether and clamps were placed upon the stomach and adjacent portion of the small intestine. This portion of the alimentary canal was then carefully removed, inflated and hardened. Portions of the organs were then removed and the string was found lying in the position which it had occupied before death, clamps making sure of the accuracy of this observation. Obviously it was possible for the shot to pass in one of four directions, either through the pylorus and past the stoma into the jejunum, or through the pylorus and through the stoma into the stomach. This latter constituted what the authors call a direct cycle. The other direction in which the shot might pass would be through the stoma and on into the jejunum, or through the stoma up toward the pylorus and into the stomach. This the author designated as a retrograde cycle. In several cases in which several shot with their accompanying strings were fed to the same animal, both cycles were present, and it was not uncommon to find that the shot had passed through the stoma and through the

¹ Medical Record, 1909, vol, lxxvi, p. 621.

pylorus as well, each shot reaching the jejunum safely, one through the natural channel and the other through the newly created path. As a sequence to these studies, it is of great interest to note the findings of Bettmann and White,¹ of Boston, who give a comprehensive study of 175 cases of gastro-enterostomy operated on during the last seven years, with special reference to postoperative conditions. Their classification is as follows:

1. Cases of pyloric obstruction with active ulceration at the pylorus.
2. Cases of pyloric obstruction without active ulceration at the pylorus at the time of operation.
3. Cases of ulcer without pyloric obstruction.

The immediate mortality in 150 benign cases was 10 per cent. Nearly two-thirds of the patients were reported as well, while one-quarter were practically unimproved by operation. Immediate mortality was greatest, as one would naturally expect, where there was active ulceration at the pylorus. The point of greatest interest in the paper would appear to be the statement that the final results were approximately the same in cases of ulcer without obstruction, and obstruction with or without ulceration. This, it will be noted, does not coincide with the views of Brewer and others, who hold that except in rare instances the operation is indicated only in cases of pyloric obstruction, and this because the final results from operation in the presence of an open pylorus have seemed far from gratifying.

As to secondary operations, the table shows that but one person in three was restored to good health. Another important point in this paper would appear to be that no better results were obtained in the last year than those which were shown after the operation seven years ago. The study is, however, a preliminary one, and is based primarily on the posterior type of operation.

The authors report preliminary findings in 20 cases in which the gastric secretions were studied before and after operation. Ten cases showing hyperacidity remained hyperacid. In 3 cases the secretions became or remained normal. In 3 cases the secretions were reduced below normal or remained so. In 4 cases the free hydrochloric acid disappeared entirely. Later findings as to the influence of the operation upon gastric secretion will be most welcome, because it would seem reasonable to believe that either in some direct modification of the chemical balance, or in the modifications of the enzyme production, the operation does good. In the presence of the experimental studies referred to, it can hardly be probable that the benefit is wrought simply by the mechanical diversion of the food current, for enough has been done to justify the belief that either such diversion does not occur, or at least that its efficacy has been grossly exaggerated.

¹ Medical Record, 1909, vol. lxxvi, p. 598.

The Emotions and Digestion. Cannon's¹ article contains points of great interest to the surgeon. In studying the movements of the stomach in cats, he was at a loss for a number of weeks to determine why, in certain animals, peristalsis ceased entirely when the animal was placed recumbent, and why in others it did not. Finally, he discovered that the difference was attributable to the sex of the animal. Males resented the inconvenience of having to lie quiet for a few minutes, whereas the female cat, especially an old one, was so little affected by this procedure that the peristaltic waves of the stomach and intestine remained normal throughout. Apropos of this, Bettman and White, in the article previously referred to, note the predominance of surgical diseases of the stomach in the male. Of the benign diseases, two-thirds were in men; of the malignant diseases, four-fifths were in men. Should any parallel be drawn? They are of great importance upon transpleural surgical work upon the stomach. Although as yet in an experimental stage, they promise to be of great assistance in the near future in certain operative procedures upon the cardiac end of the stomach, and indeed upon the entire organ. The observation of Cannon upon the nerves of the stomach, also described in this article, have long been a mooted question as to what impulse, if any, the splanchnics have upon gastric peristalsis. When the vagi were severed and the splanchnics alone remained, peripheral irritation caused the usual total cessation of the movements of the stomach and of the small intestine. Impulses along the splanchnics, therefore, inhibited the movements of the intestines and the stomach as well. When the splanchnics were cut and the vagi remained, slight peripheral irritation had no effect upon the movement of the small intestine, but if prolonged, the gastric peristaltic wave became very shallow. Thus it appears that the vagi convey to the stomach not only the motor impulses generally attributed to them, but also inhibitory impulses. When the splanchnics and vagi are all cut, it is impossible to stop the movements of the alimentary canal by peripheral irritation.

It may not be Quixotic to suggest that certain persistent and chronic cases of gastric motor insufficiency might be improved by an injection of osmic acid or absolute alcohol into their splanchnics, depending upon the well-defined, but small inhibitory power of the vagus to maintain proper balance of motion.

Perforated Gastric and Duodenal Ulcer. It is less than thirty years since the first operation for perforated gastric ulcer was performed by Mikulicz, and less than twenty years since the first successful operation was performed by Kriege. So rapidly have surgeons learned to cope with this disease that at the present time one expects recovery if the patient is seen within a few hours of the accident. No less striking

¹ American Journal of the Medical Sciences, 1909, vol. cxxxvii, p. 480.

than the improvement in the mortality is the change of opinion in regard to treatment. Fifteen years ago at the annual meeting of the British Medical Association the commonly expressed opinion was as follows: (1) The surgeon should postpone operation until initial shock had passed off. (2) The abdominal cavity should be freely irrigated with gallons of water at 112°. (3) Feeding by mouth should be avoided for several days. All of these directions may now be regarded as harmful. Carwardine,¹ who is able to report a series of twelve successive perforations of the stomach or duodenum with eleven recoveries, attaches importance to rapid operation; no irrigation; multiple drainage (one tube to the site of perforation, a second and third in the right and left lumbar regions, and a fourth in the suprapubic region if fluid exists in the pelvis); elevation of the patient's body; early feeding by the mouth and continuous saline irrigation by rectum immediately after operation. While in no way wishing to detract from the brilliant results obtained by this operator, it is only fair to add that ten of his patients were seen in eight hours or less after perforation, the remaining two being seen in twelve and eighteen hours. The fatal case was seen in five hours. In every instance the perforation was sutured and sometimes reinforced by a graft. In two cases gastro-enterostomy was performed at the time, and in two cases at a later date.

Ewald² gives some practical points which will aid the surgeon in finding a perforated gastric ulcer. In almost all cases it is located close to the pylorus. It is most directly reached through an incision made a little to the right of the median line, dividing the right rectus muscle. The longitudinal ligament is pushed toward the median line and the peritoneal cavity is opened. When the left lobe of the liver is lifted up, the perforation will be exposed. It is unnecessary to draw out the stomach. The area involved in the perforation in the great majority of cases measures only about two inches square.

Pathological Relationship of Gastric Ulcer and Gastric Carcinoma. One of the most important papers on the surgery of the stomach appeared in the December, 1909, issue of the *American Journal of the Medical Sciences*. Wilson and MacCarty present a report of 218 cases, which comprise the material obtained from the operative clinic at Rochester from January 1, 1905, to April 1, 1909. Eight were from the duodenum, and of these all were simple ulcers. The remaining 210 were from the stomach. Of these, 47 were ulcers without suspicion of carcinoma, 2 were sarcomas, 2 adenomas, and 1 a diverticulum. Of the remaining 158 in the stomach, 5 were ulcers with enough microscopic appearance to place them in the doubtful class as possible transition cases. Of the remaining 153 cases, which were undoubted carcinoma, 109, or 71 per cent., presented sufficient microscopic evidences of previous

¹ Lancet, 1910, vol. i, p. 239.

² Zentralblatt f. Chirurgie, 1909, p. 1281.

ulcer to warrant grouping them as carcinoma developing on previous ulcer. Whereas, theoretically at least, it has been considered probable for many years that there was an immediate relationship between gastric ulcer and carcinoma, the profession has never before been treated to a paper so convincing, both because of its source and because of its individual excellence. Roughly speaking, the authors show that a little more than two-thirds of a very long series of carcinomas undoubtedly took their origin in pre-existing ulcers. As they say, this subject has been much discussed; the pendulum swinging backward and forward because of insufficient accurate knowledge of the subject.

One of the conclusions in this paper, which is at variance with the older idea that gastric carcinoma and gastric ulcer occur in different regions of the stomach, is that large ulcers having scar-tissue centres and overhanging borders, deep in the bases of which cancer is present, in almost every instance have unmistakably originated on the lesser curvature of the stomach, the usual site of gastric ulcer. Furthermore, in almost every case there is a clinical history suggesting gastric ulcer for years preceding the relatively short history of gastric cancer. The authors attribute the slowness with which this transition theory has been accepted, first, to a general failure to recognize the frequency of gastric ulcer clinically; second, to the failure to recognize that gastric cancers are not primarily pyloric tumors, but extensions thereto from the lesser curvature; and, finally, to the undue weight given to autopsy observations. Obviously, when the neoplasm has developed sufficiently to cause death, it has usually obliterated all evidence of previous ulcer. The great importance of this monograph and the desirability of disseminating its teachings widely throughout the profession makes the following quotation from its conclusions extremely pertinent.

As the pathologist examines stomach specimens from the surgical clinic, he constantly observes the various steps in the following sequence:

1. Chronic ulcers from the centres of which the mucosa has disappeared, leaving a scar-tissue base.
2. In the overhanging borders of the ulcers the mucosa is proliferating.
3. Deep in the borders many groups of epithelial cells have been nipped off by scar tissue and are exhibiting all stages of aberrant proliferation with infiltration of the surrounding tissues.
4. Metastases are forming in the lymphatics of the stomach wall and adnexa.

A small percentage of cases operated upon are too far advanced to show these steps, and a very small percentage—probably not over 2 per cent.—give evidence of rapid aberrant epithelial proliferation and infiltration without any sign of previous ulcer.

Adopting Adami's classification we may, therefore, correctly designate most gastric carcinomas as "blastomas originating from unipotential

cells of postnatal displacement," although it is probable that a very small number are "blastomas originating from unipotential cells that assume neoplastic characters without displacement and rapidly assume malignancy."

THE SMALL INTESTINE.

Laparotomy on the Battle Field. The French Société de Médecine Militaire recently closed a long and at times bitter discussion over the value of the performance of laparotomies near the battle field. By an almost unanimous opinion the practice was condemned. Illogical as this conclusion may seem to one who is familiar only with the treatment of gunshot wounds in civil life, it must stand, at least for the present, as the world's best judgment. It is interesting to review the history of discussions by which this verdict has been reached. According to J. Daché,¹ a military surgeon of France, the advisability of laparotomy at the front in war was first urged by Chauvel at the Surgical Congress in 1888. He took the ground that gunshot wounds of the abdomen were nearly always fatal if not treated; that Bull, Nancrède, and others had shown that many such patients could be saved in civil life by a prompt laparotomy. Chauvel urged that wounds of war, produced by bullets of higher velocity, must be much worse than those of peace, and hence, the greater need for prompt laparotomy.

At the same Congress, Delorme took the opposite view. The facilities at the command of the surgeon in peace were lacking at the front in time of war. The patient often lay on the ground for hours after his injury and then was carried long distances over rough ground. The emergency hospital was primitive—usually a badly lighted tent, which could not be heated. The surgeon had not the facilities of a well-equipped hospital; he was, moreover, influenced by the outcome of the battle, and was hurried by the demands of more patients than he could attend to. Hence, only in exceptional cases should laparotomy be performed.

Reclus urged against laparotomy on the ground that spontaneous recovery often followed gunshot wounds produced by bullets of small calibre and high velocity. The mucous membrane blocked the opening, adhesions formed, and muscular contraction, aided by the emptiness of the intestine, prevented the escape of septic material.

It will thus be observed that right in the beginning of this discussion, which was to continue for twenty years, the three principal factors were clearly presented. (1) Abdominal gunshot wounds in civil life are almost invariably fatal, unless treated by prompt laparotomy. (2) The conditions for prompt laparotomy in war are imperfect. (3)

¹ Arch. prov. de Chirurgie, 1909, vol xviii, p. 267.

Abdominal gunshot wounds received in battle if untreated are not nearly so fatal as similar wounds of civil life; hence, there is less need of prompt treatment by laparotomy. But the impetus given to abdominal surgery by the successes of civil life was too great to be resisted and military surgeons bent themselves to the task of improving the conditions of operation at the front. In the absence of large wars, the discussion was for ten years a theoretical one—but during this period most writers ranged themselves with Chauvel in favor of prompt laparotomy.

Then came the China-Japan War with its record of two laparotomies and two deaths; and the war in Cuba, with ten laparotomies and nine deaths; a campaign in Tirah, with five laparotomies and five deaths. But these small figures failed to effect any change in the opinions then generally held by surgeons.

At the annual meeting of the British Medical Association in 1899, Stevenson reviewed the question and again affirmed the necessity of prompt intervention, except in patients brought to the surgeon after a long interval had elapsed. If the patient was first seen after the lapse of some days and peritonitis had already developed, operation was useless; if peritonitis had not developed, it was better to withhold operation on the ground that intestinal contents had not escaped. With scarcely a criticism, the surgeons present agreed with him. In this attitude of mind they went into the war in the Transvaal and laparotomy was practised on a large scale. With what opinion did they return home? Treves, writing in 1900, said that laparotomy is contraindicated if the man is first seen more than seven hours after he is shot; if he has been carried a long distance; if he has been wounded with a full stomach; if the shot has passed the abdomen obliquely or transversely, thus making numerous intestinal wounds; if the ball has remained in the body; if the liver, spleen, or kidney has been struck—as recovery usually occurs spontaneously from these wounds; or if the colon has been injured—for wounds of the colon, except in its transverse portion, are usually not fatal.

W. Dick wrote that he had been an advocate of immediate laparotomy until he saw the wounds produced by a Mauser bullet. Since then his opinion was modified. Makins expressed himself less conservatively than Treves, but said that in view of the numerous spontaneous recoveries, abdominal exploration could not be advocated as a routine practise.

Roberts blamed the bad results to the conditions present in most field hospitals. In suitable surroundings he advocated laparotomy in the presence of internal hemorrhage threatening life, and in the presence of evident perforation of the stomach or intestine.

Thus the South African War completely changed the opinion of the British surgeons. They went to the front full of enthusiasm for laparotomy; they came back full of reserve. In fact, the results almost justi-

fied MacCormac in his extreme statement that the men operated upon for abdominal wounds, died; while those that were let alone, recovered.

Still the world was not willing to accept their conclusions as final. Thus Nimier, writing a review of the Transvaal results in 1904, says: "In the face of the miserable conditions which fully explain the failure of laparotomy in war, we are forced to ask if it is not preferable that the surgeon should withhold his hand. The statistics of the chief military surgeons show beyond a doubt that medical treatment in these cases is superior to laparotomy." But he adds that it would be unfair to close this study without a word in favor of laparotomy; it offers to some patients the only chance for life. He mentions one whose small intestine was completely cut across and who recovered after laparotomy. He thinks surgeons should be on the watch to distinguish such cases from those in which the character of the pain, abdominal contraction, and other signs point to only a slight peritoneal irritation, and in which medical treatment is unquestionably the best.

The campaign in Manchuria soon gave opportunity to again test the different forms of treatment. The ardor of Russian operators soon gave out in the face of almost uniform failure. After the war, Gedroitz determined upon three hours after injury as the extreme limit of primary laparotomy, and said that almost the sole reason for its performance is the certainty of internal hemorrhage. Von Oettingen limited intervention to those cases in which it was clear that internal hemorrhage or other lesions existed, which, if allowed to remain untreated, would speedily cause death.

In October 1908, the results were again reviewed by the French Society of Military Medicine. Billet and Douche admitted that laparotomy, while theoretically possible in an ambulance or field hospital, is against the best interests of the wounded man. Toubert said that operation under proper conditions is not practicable. Sabatier advanced against laparotomies the additional fact that their performance caused neglect of many patients wounded in other portions of the body who would be benefited by prompt surgical attention.

Ferraton, Reynier, Moty, and Gauthier made rather a feeble protest against the opinion of an overwhelming majority, when they advocated in place of an extensive laparotomy simple abdominal incision combined with semierect posture and drainage.

It is, I think, a safe prophesy that surgeons will not long be willing to stand aside and idly wait for the recovery or death of those suffering from gunshot wounds of the abdomen produced by the small caliber, high velocity bullet; and yet, statistics compel them to do so unless a better plan of treatment can be suggested than has hitherto been employed in war. Already Vaucresson¹ has outlined such a plan.

¹ Arch. provinc. de Chirurgie, 1909, p. 145, 193, 279, and 350.

He would have one or more aseptic ambulances, virtually operating rooms on wheels, accompany each army. Each should have its operating staff. They should be stationed as near as possible to the firing line, and should only handle patients with gunshot wounds of the abdomen. Such patients should be brought to them as speedily as possible, preferably by automobile ambulances. After being operated upon they should be placed in a suitable field hospital or tent reserved exclusively for them. Perhaps in some such way as this the military laparotomy may be freed from the odium at present attached to it.

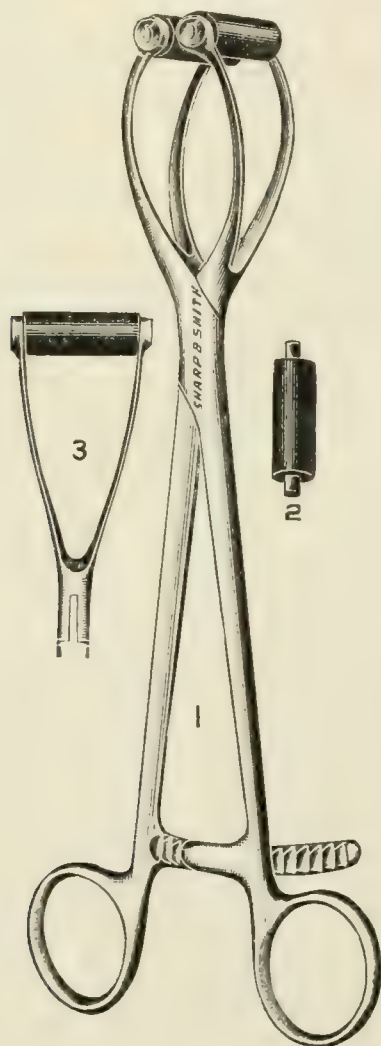


FIG. 18.—A new viscera forceps. 1, the complete instrument; 2, one of the jaws of the forceps removed from the frame; 3, front view of a jaw section of one of the blades. (Barker.)

An Instrument to Hold the Intestine. Barker¹ has invented a new instrument for holding the stomach, intestine, or any other tissue liable to injury. It is a light forceps, over the ends of the blades of which may be slipped short sections of rubber tubing. The accompanying illustration makes this clear (Fig. 2). The handles of the instrument

¹ Journal of the American Medical Association, 1909, vol. liii, p. 1560.

are made so light that there is no risk of injuring any tissue, no matter how firmly it may be grasped. At the same time, the contact between the rubber tubes and the peritoneum is sufficiently firm to prevent any slipping.

Intestinal Strangulation without Intestinal Obstruction. Ely¹ was called to see a male patient, aged eighteen years, from whom he had removed a gangrenous appendix two years previously. Drainage was employed, and in six weeks the patient was entirely well. He had no symptoms for two years, and then was seized with intense colicky abdominal pains, somewhat relieved by a movement of the bowels. During the next ten days there were daily movements of the bowels as the result of enemas, but in spite of this there was a good deal of pain and periods of vomiting. Otherwise the condition of the patient was fair; he had no fever, and his pulse was from 72 to 80. It was believed that he was suffering from *peritoneal obstruction of the bowels due to adhesions* from his previous operation. On the eleventh day his abdomen became distended, pain was intense, and fecal vomiting set in; no gas or feces could be obtained from the bowel by repeated enemas. The abdomen was therefore opened, and it was found that a portion of the peritoneal cavity was completely walled off. It contained, besides pus and liquid feces, a loose piece of gangrenous intestine about ten inches long, entirely separated from its attachment to the body. It was removed and the proximal end of the ruptured intestine was brought into the wound. The patient started well in his convalescence, but on the ninth day after operation he had a severe hemorrhage from his wound. This was followed by others until death resulted on the fourteenth day. Autopsy showed that the proximal and distal ends of the intestine entered an abscess cavity shut off from the rest of the peritoneum; but there was nothing to indicate the cause of the strangulation. The case is remarkable in that there was a daily movement of the bowels for so long a period during which sloughing of a section of the intestine was taking place.

Movements of the Intestine. Boese and Heyrovsky² have attempted to demonstrate the normal and pathological movements of the intestine by fixing under the peritoneum small foreign bodies, such as shot or needle points, and then determining their position by means of the *x*-rays. They found that any given loop of small intestine maintains physiologically its own place in the abdominal cavity. It has, during digestion, a pendulum movement of a very short range. In no case could periodically recurring movements be demonstrated. Their method of tests did not show a circular contraction of the intestines.

¹ Journal of the American Medical Association, 1909, vol. liii, p. 1482.

² Zentralblatt f. Chirurgie, 1909, Beilage, p. 60.

THE APPENDIX.

Mortality after Appendectomy. Guerry,¹ in discussing the factors which produce death in cases of appendicitis, says that when he sees a patient for the first time on the third or fourth day in an attack of appendicitis he never operates at once. He treats the patient according to the Ochsner method, thereby carrying him through the period of greatest danger, and after several days he operates to relieve the localized appendicular abscess which then exists. In his series of 545 consecutive operations, with only two deaths, there were 68 patients who were first seen on the third or fourth day. These were all treated as above indicated, all were operated upon at a later period, all had ruptured and gangrenous appendices, and all recovered. I believe that he states the exact truth when he says that the man of ordinary ability makes a mistake in thinking that because a surgeon of national reputation can operate in all cases as soon as he sees the patient, without regard to time or place, he can obtain the best results by following the same plan.

In the discussion of this paper, Haggard, Stanton, and Rodman all indorsed Guerry's position in regard to the inadvisability of operating on the third or fourth day. Ochsner restated his own position, saying that so long as the appendix still contained the septic material it should be removed at once. After that, it should not be removed until it is safe for the patient. This condition of safety can be accomplished in more than 98 per cent. of all cases of gangrenous or perforated appendicitis by gastric lavage, by giving absolutely no nourishment of any kind and no cathartics by the mouth, by giving no large enemata to stimulate peristalsis, by giving continuous normal saline by the drop method by the rectum, and by rectal feeding exclusively.

It is beyond question that the majority of surgeons in the United States are absolutely convinced of the wisdom of this procedure. Nevertheless, it has failed to convince New York surgeons, as has been shown repeatedly in discussions which have come up in medical societies. In one of these, only a few weeks ago, the opinion was repeated on all sides that while the Ochsner plan of treatment may be the best for the country, it is not to be recommended in a well-equipped hospital. And yet it is doubtful whether any hospital can show a mortality in suppurative cases quite as small as that mentioned by Guerry. Certainly none can show a smaller one, his being nil.

As an illustration of how slight differences in technique may affect the death rate after operation, it is interesting to look over the records of a large hospital, which, as they are not yet published in full, I do

¹ Journal of the American Medical Association, 1910, vol. liv, p. 3.

not feel at liberty to quote by name. In a period of about five years, 1833 patients were operated upon for appendicitis, usually in an acute stage. There were 80 deaths—a mortality of about 4 per cent. Some of the surgeons in this hospital, before rupturing an appendicular abscess, make a practice of carefully walling it about with slender strips of gauze. The others do not so protect the peritoneal cavity, but trust to sponging the pus away as it appears. Every year the mortality of the first group of surgeons is a little less than that of the second; and, taking a period of five years together, there is a difference of nearly 2 per cent., being about 3 per cent. and almost 5 per cent., respectively. With a mortality as slight as this, it is a fair question whether, if the patient is a laboring man, it is not better for him to take a slight risk and have an immediate operation rather than to delay operation for a number of days; since in the second case his absence from work would probably average two weeks longer than if he were operated on at once. Moreover, it seems possible that the risk of delay may be greater in the city than it is among a hardier people, accustomed to an outdoor life and different sort of food. May not the remark of Moynihan, made some years ago in reference to a different subject, be applicable here? He said that much of the discussion which has waged around the relative merits of certain operations would have been rendered needless if the same types of cases had been dealt with by the opposing protagonists. The difference between surgeons is not so much one of ideals as of material.

Collins¹ in discussing the mortality following operation for appendicitis, says he has lost no patient upon whom he operated within thirty-six hours of the attack. During the past five years he has had nine deaths following operation performed between the second and eighth days of the attack. Only one of these deaths occurred in his hospital practice; the others were all after operation performed at the homes of the patients. He has, therefore, arrived at the conclusion that when a patient suffering with appendicitis of more than forty-eight hours' duration cannot safely be transported to the hospital, he should be put on the Ochsner treatment and operation postponed until the acute inflammation has subsided. When the abdomen has finally become flat, pain and tenderness have disappeared, and the pulse and temperature have become normal, the appendix may be safely removed. If the attack terminates in a localized abscess, it is necessary to drain this abscess, and at a later period to remove the appendix. The percentage of appendices sloughing off in an abscess is very small. As by following this plan a second operation awaits the patient, nothing but nitrous oxid gas is given to open the abscess, in order that the patient may have no dread of the anesthetic when he comes to a second operation. A skin incision of an inch or less, intramuscular separation, and quick drainage of the

¹ Illinois Medical Journal, October, 1909.

abscess cavity requires only a few minutes. From ten days to two weeks later, when the pulse and temperature have been normal for several days, an incision is made to the inner side of the drainage tract, the peritoneal cavity is walled off with gauze, the adhesions around the appendix are separated, and it is removed. A small drain is carried to the side of the appendix through the drainage tract and the second incision is completely closed. This second operation should not be delayed too long. If it is performed while the first drainage tract is still pervious, the patient's stay in the hospital is materially shortened.

Advantage of Simplicity in Operating. Dowd¹ emphasizes the advantages of simplicity in operations in appendicitis, reporting a series of 110 operations without mortality. Nearly one-half of the patients were under fifteen years of age. Sixty-four were acute cases, the patients being operated upon either in the interval or at a late non-purulent stage. In 44 acute cases, operation was done on the first, second, or third day. Two patients were operated upon the fourth day, 1 on the fifth, 1 on the sixth, 4 on the seventh, 5 on the eighth, 2 on the tenth, 1 on the eleventh, 3 on the twelfth, and 1 on the twenty-third day. This tends to show that the risk of operation on any particular day is not unduly great. Dowd himself lays emphasis upon a small incision, the quick drainage of the appendicular site if pus is there, the removal of the appendix only if it is easily reached, the absolute neglect of the remainder of the peritoneal cavity except as it may be favorably influenced by the drainage. He makes the incision well to the side in order to avoid unnecessary contact with the small intestines, uses retractors to keep back the intestine instead of pads, locates the appendix by following the longitudinal cecal bands by means of a plain thumb forceps, separating the appendix by the fingers without the aid of the eye in many cases, and sponging up pus as it appears. He usually ligates the stump of the appendix with catgut, drains with gauze protected by rubber tissue, and applies a moist dressing in the serious cases. The patient is placed in a semi-erect posture, and continuous saline rectal irrigation is employed. It frequently happens that in many cases of well-localized appendicular abscess the first incision into the peritoneal cavity is followed by a gush of sero-pus or cloudy serum. It is a mistake to infer from this that general peritonitis has already set in. This fluid is often absolutely sterile, and is certainly never highly infectious. Many surgeons absolutely disregard this symptom, knowing the harmless character of the fluid which surrounds the abscess in the soft tissues. The pus in the abscess itself is highly infectious, and every care should be taken to protect the general peritoneal cavity from it.

¹ *Annals of Surgery*, 1909, vol. 1, p. 762 and 800.

THE LARGE INTESTINE AND RECTUM.

Megacolon. Megacolon, or Hirschsprung's disease, was spoken of at considerable length last year.¹ The number of observations has rapidly increased within the past few years. The origin of the disease and, to a certain extent, the best method of treatment are still matters of dispute. Duval² reviews the results which have followed various operative procedures. Simple laparotomy, in 15 cases, has been followed by five deaths. It was successful in relieving the symptoms only twice. An artificial anus was established in 18 cases, and to it was attributed nine cures, so that the opening could be again closed. Extraction of the fecal mass with closure of the colon was performed in 5 cases with two deaths immediately after operation, and one more after a second operation. The other two patients were still greatly troubled by constipation. Plication, or infolding of the colon, has been performed six times with six recoveries, all of the patients being benefited, but the period of elapsed time in some of these cases was short. *Colopexy*, or fixation of the colon by sutures of various sorts, has been performed ten times with ten operative recoveries. Most of these patients were relieved from their symptoms. Intestinal anastomosis has been performed sixteen times with four deaths. In 1 case it was necessary to separate the ileum from the sigmoid on account of a persistent diarrhea, and in 2 other cases colectomy was subsequently performed. Colectomy has been performed altogether in 26 cases, with six deaths.

It is difficult to draw conclusions from these results on account of the great variety of technique and, in some instances, the small number of patients operated upon. Certain measures, however, are inadvisable, notably treatment by puncture, simple laparotomy, or laparotomy accompanied by the untwisting of the volvulus. The first of these is risky, and all three are ineffectual except temporarily. The establishment of an artificial anus is also not to be recommended, the good results which have followed it being probably due to fixation of the colon to the abdominal wall. One operation, which is at least worth trying in the light of our present knowledge, is the extraction of a distinct fecal mass so well formed as to act as a foreign body, and followed by a suture of the wound in the colon. This will, however, be indicated in few cases. Plication of the colon is attractive on account of the ease of its performance and its freedom from risk. A similar operation performed upon the stomach has failed to give satisfaction, and it is probable that further experience with colonic plication may lead to the same result. Colopexy or fixation of the colon to the abdominal wall

¹ PROGRESSIVE MEDICINE, June, 1909, p. 113.

² Revue de Chirurgie, 1909, vol. xl, p. 506.

has also a small operative risk and seems to have given excellent results; but, like ileosigmoidostomy, it leaves within the abdomen an abnormal organ whose dilated walls in certain places lead to stagnation of the intestinal contents and favor toxemia, if not septicemia. Anastomosis, when possible, should be made between the ileum and a portion of the colon below the dilatation; but this is not always possible.

Resection, the most radical procedure, is also the most logical in many cases. Certainly, it is the operation of choice in those cases in which only a portion of the colon is dilated. There are unfortunately cases in which the whole large intestine and the small intestine also are dilated, and under such circumstances surgery seems to be helpless.

Exclusion of the Colon and Colectomy. Lane,¹ who looks upon the large intestine as often the cause of auto-intoxication so extreme as to warrant its removal, has advanced his theory another step. He affirms that such auto-intoxication is responsible for the development of tubercle, since it reduces the power of the individual to repel invading organisms. He has, therefore, removed the large intestine of a number of patients with tuberculous joints who were rapidly going down hill. While he does not yet feel that he has sufficient data to make positive statements as to results, he believes that surgical treatment of this character will prove a means of help, whereas we are now nearly helpless. The abdomens of the patients thus far operated upon certainly presented evidence of intestinal stasis of an advanced character. Lane's choice of operation depends upon the presence or absence of pain. If simple auto-intoxication is present without pain, he contents himself with an ileosigmoidostomy, dividing the ileum a few inches from the cecum. If, in addition to the symptoms of auto-intoxication, pain exists, he advocates the removal of the large intestine in addition to the ileosigmoidostomy. The mortality of this greater procedure, which in his earlier cases was very high, was due in part to prolonged vomiting and in part to sepsis. He has been able to avoid the vomiting almost entirely by pre-operative intravenous injection of five pints of normal saline solution, while the risk of infection has been lessened by the use of small drains in the angles of the abdominal wound. It is chiefly in cases of advanced toxemia that infection is to be feared.

Hall,² convinced of the excellence of Lane's method, removed the colon from a young man suffering from an obstinate constipation, aggravated perhaps by sterilized sand which the patient had eaten for a number of days in the hope of stimulating bowel action. Osteopathy and the various forms of electrical and mechanical treatment, in a well-equipped sanitarium, had likewise proved futile in his case, and, melancholia developing, Hall felt justified in anastomosing the ileum and

¹ Clinical Journal, 1910, vol. xxxv, p. 225.

² Canada Lancet, 1910, vol. xliii, p. 415.

sigmoid, and removing an intervening forty inches of colon. The patient made a good recovery, with a moderate diarrhea, which disappeared in three weeks. With the idea that colectomy has a much wider range of benefit than merely the relief of constipation, Hall performed it recently in epilepsy. Unfortunately, the patient died on the fifth day with symptoms of obstruction, including fecal vomiting. Autopsy revealed a kink in his ileum about sixteen inches above the anastomosis.

Graves¹ reports an interesting case, in which he operated upon a woman, aged thirty-eight years, for constipation, with pain and great abdominal distention. The distention was confined to the colon, and no cause for it being apparent, Graves cut across the ileum and established an ileosigmoid anastomosis. The patient did well for some months, and then suffered a return of the painful attacks, with diarrhea, which prolonged medical treatment failed to relieve. Food passed this patient in about sixteen hours instead of twenty-four hours, which is considered normal for one-third of the adults examined. The abdomen was, therefore, reopened and the excluded colon, measuring twenty-nine inches, was removed. Pain disappeared, though at the time of report the movements were still rather loose.

Graves performed a colectomy upon another patient on account of the failure of an ileosigmoidostomy. This patient had previously had a right colostomy, and while this was still functioning, the ileum was cut across and one end implanted into the sigmoid. Two months later the right colostomy again began to discharge feces, and this increased until almost nothing passed the anus. The whole colon was removed, but with fatal results. This marked instance of reversed peristalsis in the colon is by no means unique. Most patients with ileosigmoidostomy exhibit it to a greater or less extent. Graves thinks its possible ill effects should be combated, when the colon is not removed, by bringing the distal cut end of the ileum into the abdominal wound, or by implanting it into the sigmoid at a little distance from the implantation of the proximal end.

Enterorectal Anastomosis. Lardennois² says that an artificial anus should only be used temporarily, or as a last resort in desperate cases. Whether the obstruction involves the upper part of the rectum or the lower end of the pelvic colon, an attempt should be made to avoid it by the establishment of a connection between the small intestine and rectum. This operation should not be confounded with an ileosigmoidostomy. When attempted by suture, it is much more difficult and dangerous than ileosigmoidostomy. Therefore, the anastomosis should always be performed by means of a button, one-half of which is passed upward within the rectum after introduction through the anus.

¹ Proceedings of the Royal Society of Medicine, 1909, vol. ii, Surgical Section, p. 121.

² *Revue de Chirurgie*, 1909, vol. xl, p. 803.

Carcinoma and Diverticulitis of the Sigmoid. Diverticulitis of the sigmoid was reviewed so thoroughly last year¹ that it is unnecessary to refer to it again at length. It is, however, interesting to note that a perforating diverticulitis of the ascending colon has been seen by Hartwell.² The patient, a woman, aged forty-three years, had suffered from several attacks of right abdominal pain previous to the attack which determined her operation. There was then a hard mass in the right loin, which proved to be an inflammation about a perforation in the cecal wall, to which the tip of the appendix was attached. The appendix and a part of the cecal wall were removed, and pathological examination showed the inflammation to have started in a diverticulum of the cecum, which had afterward perforated. The appendix was not perforated.



FIG. 19.—Carcinoma on diverticulitis of the sigmoid. (Giffin and Wilson.)

Giffin and Wilson³ report a case in which carcinoma of the sigmoid developed in an old diverticulum. A mistaken clinical diagnosis of carcinoma has not infrequently been made in such cases, as pointed out last year; but in this case the clinical diagnosis was confirmed at operation and by the pathologist. The patient was a man, aged sixty-eight years, with a history of occasional attacks of pain and bloody diarrhea, existing for three years. The periods of intervening unbroken health were continuous for many months. For a month or more previous to operation slight loss of weight, almost continuous slight pain, a trace of blood in the stools, and a palpable tumor rendered a diagnosis of carcinoma probable. The tumor was situated at the junction of the descending colon and sigmoid. A free excision of these structures was made, followed by a primary lateral anastomosis, the outcome of which is not given. An examination of the portion of the

¹ PROGRESSIVE MEDICINE, June, 1909, p. 107.

² Annals of Surgery, 1910, vol. li, p. 269.

³ American Journal of the Medical Sciences, 1909, vol. cxxxviii, p. 661.

intestine which was removed showed the presence of four diverticula in the vicinity of the carcinoma. One of these, indicated by the arrow in Fig. 1, was completely enveloped by the carcinoma. The dark lines in the centre of the tumor mass below the arrow may have been other diverticula, but their mucosa, if it existed, had been entirely destroyed; it was impossible to state this definitely. At the left of the figure carcinomatous lymph glands are shown.

A similar case was reported by Franke, diagnosticated before operation, and two others reported by Telling were found at autopsy.

The "Rectal Shelf," a sign of Carcinoma Elsewhere. Blumer¹ calls attention to a sign of diagnostic and prognostic importance which he calls "The Rectal Shelf." It has also been noted by others. If the examining finger passes up the anterior wall of the rectum, this sign may be appreciated, in certain conditions to be described, at the level of Douglas' cul-de-sac. This level is between the upper border of the prostate and the limit of palpability. The entering finger infringes upon a shelf, of almost cartilaginous consistency, which projects into the rectal cavity. In some cases, further palpation shows that the whole circumference of the rectum is involved in an annular zone of infiltration, a signet ring stricture, as called by Schintzler, most marked anteriorly and tapering off toward the posterior wall. In such cases the infiltration has involved the rectal submucosa, and is no longer confined to Douglas' cul-de-sac. The infiltrated area is fixed, shelf-like, without ulceration. It is a sign found most often in males, and when it occurs in females it is not to be confounded with a tumor from the back of the womb. This rectal shelf is usually a metastasis from a primary cancer elsewhere, most frequently in the stomach, sometimes in the liver or pancreas. Blumer thinks it a far better sign in the male, since in the female the metastases are apt to be in the ovary. An important point, to distinguish it from a primary cancer of this situation, is the lack of ulceration, also the lack of pus and blood in the stools. It was found by him in 5 out of 9 cases of gastric carcinoma. The same shelf is found at times in tuberculous peritonitis. When infiltration is present in this situation as the result of other chronic inflammatory conditions within the peritoneum, such as chronic appendicitis, Blumer thinks there are more apt to be unilateral partial shelves than signet-ring shape. When this metastasis is found, radical operation on the primary growth is usually contra-indicated. The shelf may explain some intestinal obstructions.

"Obscure" Rectal Pain. Wallis² believes that the cases described are not so obscure or rare as is supposed. The pain is neuralgic in type, and, in the first case mentioned, is of two kinds: (1) The short and severe, and (2) the less severe but long drawn out. Both kinds were

¹ Albany Medical Annals, 1909, vol. xxx, p. 361.

² The Lancet, 1909, vol. i, p. 94.

in exactly the same place and seemed to centre in the left side of the rectum a short distance above the anus. The first was invariably brought on by a movement of the bowels, the second by a movement of the bowels or by flatus, coitus, a long journey, or prolonged sitting, and again by no apparent cause, as when it began during sleep. The first pain was so apt to follow a movement of the bowels that during such movement there was always a period of suspense as to whether it would follow. If it did occur, it would follow immediately, and felt like the opening of glove stretchers; in a minute or so it would reach its climax of acute cutting pain, and after a few seconds begin to fade gradually, the whole phenomenon lasting only two or three minutes. It rarely developed into the prolonged variety. The second form might start at any time, and spread frequently into stomach and testis, especially on the left side. These regions would become sore. The pain often lasted for hours, causing illness, sweating, and sometimes syncope. This patient had been given many kinds of drugs; had had an operation for piles, and later had his coccyx removed, without any benefit; neither had a trip around the world availed anything. The lesion found upon examination under anesthesia was as follows: There were three subcutaneous pockets, one of unusual length extending upward one and one-half inches. The treatment consisted in the removal of the whole ring of mucosa and suture of the upper cut edge to the anal skin. For ten days later there were spasms of pain from flatus, etc., relieved by enemas. Then the pain ceased entirely. The second case was very similar, and both patients were converted from invalids into robust men. The author thinks this a common trouble in young people and the source of many rectal complaints, especially acute proctitis.

Anesthetics for Rectal Surgery. Porter¹ advocates a combination of general and local anesthesia for rectal work, especially when operating on hemorrhoids. He feels that the necessity for complete relaxation of the sphincter in these cases requires the administration of general anesthetics to a dangerous degree, and demands very constant watchfulness on the part of the anesthetist in order to maintain this condition during the whole period of operation. To paralyze the sphincter without rupturing some of its fibers entail a good deal of force and some judgment. With an anesthetist who has had little experience in this variety of operation, much embarrassment to the operator may occur, owing to the contraction of the sphincter preventing a clear exposure of the area of operation, especially if the requisite dilatation of this muscle has not been procured.

In doing some operations for interno-external piles under *eucaine*, he noticed the great ease with which the sphincter could be dilated,

¹ British Medical Journal, 1909, vol. i, p. 17.

and that it remained quite patulous during operation. It occurred to him that the use of this drug would be of great assistance if combined with general anesthesia. Ten c.c. of a solution was injected into the external sphincter on each side of the median raphé, the needle being inserted in the middle line and pushed into the muscle in an outward direction. If this is done fifteen minutes before the general anesthetic is commenced, by the time the patient is under its influence, the sphincter will be found quite paralyzed. It has been found possible to complete the operation under very light anesthesia; in fact, such a degree as would be quite useless without previous injection of eucaine and adrenalin. There is said to be a comparative absence of pain after the operation, due, presumably, to absence of bruising and tearing of the sphincter. The lessened amount of anesthesia which is inhaled by the patient must also contribute to a more rapid return to his normal condition and lessen the anxiety of both operator and anesthetist, especially when dealing with private patients.

Hawley¹ believes that after operative work in rectal diseases a short stay in bed is advantageous as regards the final recovery of the patients, their comfort, and their return to usefulness. This reference is especially of those who undergo the more severe operations under general anesthesia. Such patients are often better for being up and about long before complete wound healing. He classifies most cases of rectal ailments, however, under minor diseases, curable by proper operation without confinement to bed, and in many instances without detention from business, and also without general anesthesia. He is not, however, an advocate of regional anesthesia in all these operations. He attributes the change from general to successful local anesthesia to improved methods in technique. He uses the injection of eucaine, cocaine, and the Schleich combination, infiltration of sterile water, the topical application of alypin or orthoform, and occasionally freezing by ethyl chloride. The last method he finds painful before and after operation, and, if extensively used, apt to produce sloughing of the tissues. He believes that regional anesthesia is not permissible where more than twenty minutes of time or extensive dissection is required.

Of the conditions which may be treated by regional anesthesia, he names piles, fissures, anorectal and rectal ulceration, all varieties of simple fistula, superficial abscess, pruritus ani, polypus, stricture and prolapse of the rectum.

For the dilatation of the sphincter, necessary as a preliminary to most of these operations, he injects $\frac{1}{8}$ per cent. solution of eucaine, as follows: Introduce the needle of a syringe loaded with an aseptic solution one-half inch behind the posterior commissure. Pass upward and outward to the right or left for about one-quarter of an inch, and inject a few

¹ International Journal of Surgery, 1908, vol. xxi, p. 333.

drops into the skin. Now push along in the same direction and a little deeper, keeping the same distance from the anus for another quarter of an inch, and inject more, then still deeper and well into the sphincter, where ten or fifteen drops or more of the solution is injected. Next, withdraw the needle nearly to the point of entrance and insert in like manner into the tissues on the other side of the anus where the same injection is made. In from three to five minutes anesthesia will have been produced, and the sphincter may be dilated by introducing the lubricated thumbs or index fingers into the anal canal and gently pulling in opposite directions, or better, by introducing a suitable tip attached to any of the ordinary vibrators and making moderately firm pressure for three or four minutes. He finds this latter method productive of little pain or discomfort even without anesthesia.

The technique of injecting the tissues for various operations is simple. Skin, subcutaneous and deeper tissues, the mucosa and submucosa are injected and thoroughly distended, according to the procedure to be undertaken. Weak solution are practically as efficacious as stronger ones, if thorough distention is accomplished. When a superficial incision is all that is required, as for a thrombotic hemorrhoid, the skin above is infiltrated. Internal hemorrhoids require the needle to be placed well into the tumors and distention until they appear glassy. For severe operations and for the removal of several large tumors, he advises general anesthesia. The higher the tumor, the more satisfactory he finds regional anesthesia.

For fissure in ano, Hawley finds that injections into the skin and tissue beneath the fissure render operations painless. When the fissure is too superficial to involve the muscle, moderate dilatation and ichthyol every second day will cure. Here 4 to 6 per cent. solution of cocaine or eucaine, applied on cotton to the raw surface, renders the use of ichthyol painless. By infiltration anesthesia, anorectal and rectal ulceration may be treated by electrocautery or dissection. After injecting the pedicle and rectal mucosa, rectal polypi may be treated by snare, clamp, cautery, ligation, or scissors. All save simple straight fistulæ require general anesthesia. Injections of eucaine or cocaine solutions often render examinations and non-operative treatment painless in sensitive subjects. In general, sterile water injections are more painful than eucaine or cocaine solutions, but postoperative pain is less, as is postoperative hemorrhage, which is seldom troublesome in any case. Small piles become large after infiltration, and the exact contour is often misjudged. The length of time that the recumbent position is necessary depends upon the strength of the patient, the nature and extent of the operation. Overdistention will cause sloughing. Experience aids in judging the desirable degree.

New Specula to Facilitate Diagnosis. Lewis¹ recommends the use of a glass rectal dilator instead of the usual rectal speculum. The

¹ New York Medical Journal, 1909, vol. xc, p. 806.

advantage is that the entire surface of the rectum is visible when a large glass dilator has been inserted. Pressure causes the mucous membrane to appear pale; but any fissure, an erosion, or thrombus is easily seen. An electric light is a distinct aid in the examination. In order to smooth out the folds of the rectum it is necessary to use a large instrument, which should be well lubricated with glycerin or some other transparent medium. Vaseline obscures the view. After the instrument has been inserted, it may be tilted or slightly withdrawn if it causes pain through pressure. By this method of examination one is often able to detect slight erosions, usually hidden in the folds of the anal mucous membrane. They appear insignificant, but may be the cause of great suffering to the patient.

Another form of glass speculum is that used by Roberts.¹ It was designed to be introduced with a minimum of pain. It is claimed by the author that even an anus which is the seat of an irritable ulcer tolerates examination by means of this instrument in a most surprising manner. The view is very satisfactory. Since the distention is equilateral, there is no distortion of parts as when they are made to appear at the end of a tubular speculum, or with a dilating speculum. He believes that the new speculum may facilitate finding the mouths of fistulous tracts. Hemorrhoids are seen as bluish spots, and their number and size are much better judged than when a straining method forces down the entire venous tissue.

The tube (Fig. 4) is of a proper thickness of very clear glass. The opening in the side is for applications or probing of possible fistulæ. A translucent lubricant, such as glycerin or one made from Irish moss, and the light from an electric headlight or a headmirror are necessary, diffuse light failing to serve the purpose.

Operations for Pruritus Ani. When Ball² first proposed an operation for pruritus ani, by which all the sensory nerves to the affected skin are divided, a great advance was made in the treatment of this annoying condition. His operation consists in reflecting two lateral flaps of skin. Curved incisions are made to the right and left of the anus (Fig. 5) and the flaps are dissected toward the anus until the junction of skin and mucous membrane is reached (Fig. 6). All exposed nerves are



FIG. 20.—A new anal speculum. (Roberts.)

¹ Journal of the American Medical Association, 1910, vol. liv, No. 2, p. 124.

² British Medical Journal, 1905, vol. i, p. 113.

divided. To prevent gangrene of the flaps, a bridge of undivided skin, half an inch or more in width, is left at the anterior commissure, and an equal amount posteriorly. These bridges are, however, undermined in order that the sensory nerve fibers running to them may also be divided. Hemorrhage is then carefully controlled and the flaps are sutured in their original position. Sensation is not restored to the area affected for some weeks or possibly months, and during this time the skin has become entirely normal, so the pruritus does not recur—at least in most cases.

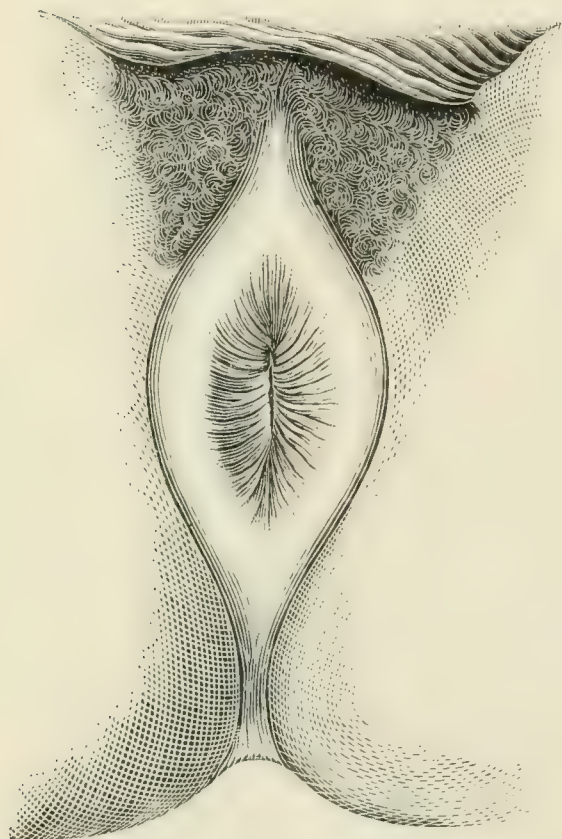


FIG. 21.—Incisions in operation for pruritus ani. (Ball.)

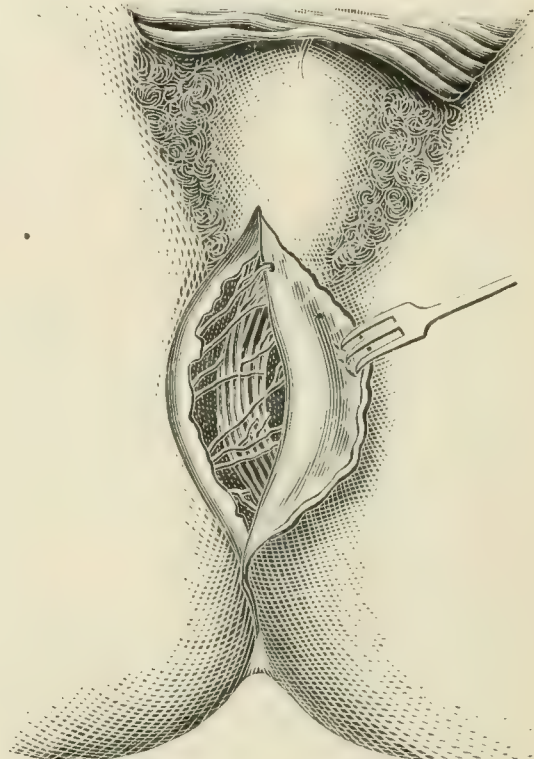


FIG. 22.—Dissection of flap for pruritus ani. (Somewhat diagrammatic—Ball.)

An objection has been urged against this operation, that gangrene of the flaps may take place, and modifications of Ball's incisions have been suggested to render this accident less likely. None of them have the advantage of the simplicity and thoroughness of dissection that Ball's method affords. Ball himself warns against allowing any blood to accumulate under the flaps, lest it lead to pressure and gangrene. If the wound is absolutely dry before the flaps are sutured, the risk of gangrene is certainly very slight. In case it is feared, on account of the general health of the individual, the undivided bands of skin in the median line may be left a little broader. Mummery¹ approves of Ball's operation when no local cause for the pruritus ani can be

¹ Clinical Journal, 1909, vol. xxxiv, p. 68.

found. He dissects the flaps up to above the white line or mucocutaneous junction, so as to divide all the small nerves which run to the skin over the area of irritation—on the principle of the operation for trigeminal neuralgia. The area of irritation is thus anesthetized, and, in his cases, the anesthesia lasted three or four weeks. The pruritus rarely returns. This method of treatment is vastly superior to cauterization with acids, and never results in stricture. Before deciding upon any treatment for pruritus, Mummery says, first find the cause. Examine the outside for tags, fistula, fissure, or an abscess; the inside for piles or polypi; then the highest part for proctitis. Catarrh high up seems a common cause for pruritus. For worms, examine the stools. A posterior ulcer on the bowel wall will cause pruritus, or it may be due to a leakage of feces from piles, etc. The most difficult cases are those without apparent cause. A silver solution of 20 grains to the ounce may suffice to cure the pruritus due to piles, but it is unwise to promise a cure. Examine with soap as a lubricant, and wash it away before applying the silver, as the latter is inert after vaseline. Have the parts kept clean and dry, using powders and lotions, never ointments. Let the patient avoid alcohol and tobacco, also soft seats. Relapses are common.

Krouse¹ reports a case in which he performed Ball's operation for pruritus ani, and in which a flap attached to the verge of the anus began to look thin and gray on the fifth day after operation. Later, a sero-sanguineous discharge escaped from beneath it. The process was at first confined to one side, later the entire circumference sloughed and was removed with the scissors. The flaps outside the elliptical incisions were healthy and united with the underlying tissue. The sloughing area closed by granulation after some weeks. The undivided bridges of skin in the median line were, in this case, less than one-half inch in width. The author goes deeply into the question of the etiology of the accident. In his opinion, the fact that the patient had albuminuria does not figure. Upon research as to the circulation of the skin about the anus, both from descriptive anatomies and from the standpoint of development, also from the investigation done by Harrison Cripps in injecting the veins, he concludes that neither the arterial nor venous systems of the rectum anastomose with those of the skin about the anus. He, therefore, condemns Ball's incisions with the narrow isthmus of uncut skin between them at either end, on the ground that this may well furnish an inadequate blood supply, as in his case, and advocates five or six radial incisions through which the dissection may be made without danger of slough. He thinks that in case the dissection is difficult, every other flap can safely be cut across at the anal margin and dissected outward toward the periphery. After all adhesions

¹ *Lancet Clinic*, 1909, vol. cii, p. 1.

are loosened, and the bleeding has been arrested, the parts are again replaced and sutured.

While the dissection in the manner suggested would not be difficult, it is hard to believe that the sensory nerve fibers would be as thoroughly divided as by the incisions of Ball. It is also worth mentioning that Cripp's views as to the lack of anastomosis about the anus are not shared by such authorities as Tuttle, Kelsey, Andrews, Gant, and others.

Bismuth Injections for Fistula in Ano. An illustration of a proper balance between operative and non-operative treatment is afforded by an article by Beach.¹ His conclusions are these:

- 1. The operation for rectal fistula presupposes free drainage and the substitution of a healthy for an unhealthy wound.
- 2. Failure to cure arises from failure to expose all ramifications of the fistula.
- 3. Operate so as to keep wound margins apart.
- 4. Never suture, for mucosal wounds heal better by granulation, especially in so vascular an area as the hemorrhoidal inch.
- 5. In deep, extensive, and inoperable fistula, use bismuth paste.

He says that our methods of diagnosis by the use of the probe, by injections of hydrogen peroxide, and colored fluids to aid in locating ramifications, are crude. The work of Emil G. Beck, of Chicago, in the diagnosis and treatment of fistulous tracts, tuberculous sinuses, and abscess cavities, utilizing a bismuth paste in order to obtain skiagraphs, is a distinct advance. Beck also reports a number of cures by the use of bismuth paste injected into the sinus and allowed to remain and harden. He claims the bismuth is eventually absorbed. The formulas employed are:

Paste for diagnosis and early treatment:

Bismuth subnitrate (arsenic free)	30.0 gm.
Vaseline	60.0 "
Mix while boiling.	

Paste for late treatment:

Bismuth subnitrate	30.0 gm.
White wax.	5.0 "
Soft paraffin	5.0 "
Vaseline	60.0 "
Mix while boiling.	

The fistula should first be dried with a strip of plain gauze removed just before injecting the paste. The glass syringe loaded with paste should be pressed firmly against the opening of the fistula and the contents slowly discharged until pressure is complained of by the patient. The treatment should be continued as long as there is a discharge of

¹ Pennsylvania Medical Journal, 1908-09, vol. xii, p. 113.

pus. Beach thinks the bismuth treatment especially applicable to so-called inoperable cases, where the tracts involve deep structures about the rectum.

Noble, Philadelphia, in discussing the paper, called attention to a point brought out by the late R. U. Martin, *i. e.*, the necessity for the surgeon, who alone knows the wound exactly, to pack it himself at the subsequent dressings. He also advocated the ambulant treatment in these cases. He proved his position against the treatment compelling a stay in bed by results. He used infiltration anesthesia to anesthetize only a part of the fistula, and never cut more than one-half inch at a time, not sufficient to cause much soreness. He cut section by section from without inward until the upper end of the tract was reached. The patient did the packing twice a day and saw the surgeon every second or third day, hence was under his personal observation and control.

Some Operations for Hemorrhoids. Perhaps no lesion of the body has given rise to more discussion than hemorrhoids. Stauffer,¹ in looking at the subject broadly, says that in our desire to relieve a patient of a very distressing condition we must not forget that he is entitled to a truthful statement as to the diagnosis and prognosis. A proper understanding as to what may reasonably be expected when assuming charge of a case often forestalls any unpleasantness. Fortunately, few conditions yield more kindly than hemorrhoids when properly treated. One should definitely determine the pathology, and accurately estimate the extent of anus and rectum involved. If ulceration is present, a section of tissue should be examined with the microscope for cancer, syphilis, or tuberculosis. Prepare the patient thoroughly. The use of regional anesthesia is apt to be overdone. It is dangerous, even when skilfully used. Its use is responsible for much incomplete and bungling work. So-called minor operations in the surgeon's office are not to be advised, save for external hemorrhoids, because preparation and after care are impossible. He advises deep ether narcosis, also gentle dilatation, since traumatism predisposes to infection and is apt to add more to the time and discomfort of convalescence than the operation itself. Choose an operation according to the following factors, which are given in the order of their importance: (1) Complete restoration of function. (2) Time required. (3) Pain produced.

The various methods may be divided into classes as follows: (1) Complete excision of pathological tissue. (2) Devitalization and tissue necrosis. (3) Partial excision and devitalization. The author believes that *excision* by one of the best methods advised, and suturing with catgut is the ideal method, but it is difficult in that it is hard to obtain and retain an aseptic field. Hence this method is limited to

¹ St. Louis Medical Review, 1909, p. 193.

selected cases, notably those of mixed and external hemorrhoids, particularly those combined with prolapse of the mucous membrane. The surgeon should remove only pathological tissue, and never attempt to substitute a major procedure when a minor one is indicated. He should control bleeding and place the sutures where good coaptation is secured, so that cleanliness can be maintained without too great discomfort. The operation is contra-indicated if ulcerated tissue exists which cannot be eradicated, or if the piles originate from so high a point as to be impossible of inspection during convalescence.

The *clamp and cautery operation* will always have its place, and is still thought by many of the best surgeons to be the only one worth consideration. It should be used only with general anesthesia. Its cicatrix is less elastic and more predisposed to ulceration and malignancy than that of incision, and it should never be used when the whole circumference of the bowel is involved, unless constriction is desired. It is likely to be followed by hemorrhage unless the operation is well done and subsequent rest is enforced. It is especially adapted to chronic cases with a relaxed sphincter in which contraction is sought. Stauffer believes that the hypodermic method of treatment is not to be despised. It is especially applicable to internal hemorrhoids with long pedicles, and in such cases it is usually preferable to other methods. Strong solutions of phenol are the best.

The *ligature method* as carried out by the ancients greatly resembles that operation of today, and its results deserve the highest commendation. Failures in operations for hemorrhoids are attributed to two causes: (1) The attempt to adapt the pathological condition to the operator's pet method, instead of selecting the operation best suited to the individual case, (2) and improper postoperative treatment.

It is hard to fix the mucocutaneous line in the *Whitehead operation*, and it is painful to cleanse the wound. An uncomfortable inversion or eversion is hard to overcome. Stauffer uses his own modification in many cases combined with prolapse. It consists in circular incision and mattress suture of the outer cuff to the inner before excision of the prolapsed portion. The line of excision should not be too close to the suture line. He inserts a packing of gauze, to be removed after from thirty-six to forty-eight hours. After three days a cathartic is given, and a hot tub bath on the fourth day. The ligature falls off on the fifth or sixth day. After that he uses a special dilator and ointment applicator.

Three years ago Vernon¹ advocated a method of excising the rectal pile-bearing area which he had employed with uniform success in a number of cases. He inserts into the dilated anus a hollow cone, shaped like a large suppository, having four holes bored near its base. The

¹ British Medical Journal, 1907, vol. ii, p. 903.

ring of piles is transfixed by two small hat pins, which, passing through the four holes, make a cross. A slender rubber tube is then tied about the mass above the pins, constricting all vessels (Fig. 7). Surplus tissue is then cut away (Fig. 8). The elastic ligature is loosened, bleeding points are secured and tied, and the circular wound closed by a continuous suture. The pins and cone are then removed.

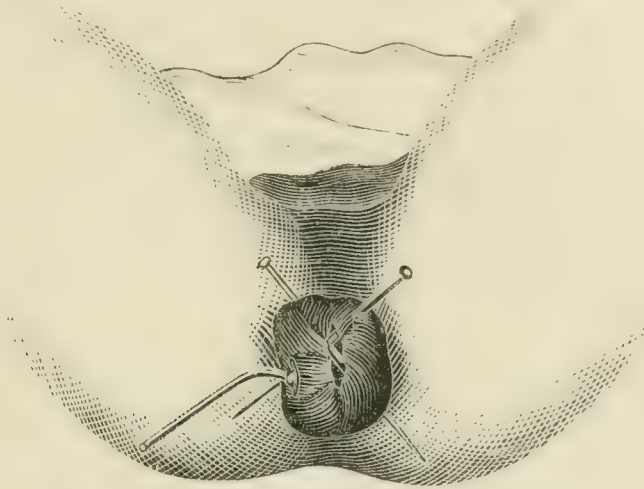


FIG. 23.—Vernon's operation for hemorrhoids. The cone inserted; the pins in place; hemorrhage temporarily controlled by elastic ligation.

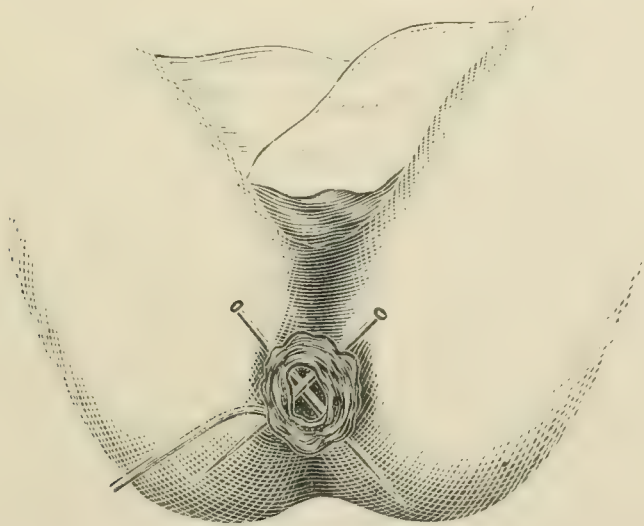


FIG. 24.—Vernon's operation for hemorrhoids. The pile-bearing area removed.

Richardson¹ has performed this operation a number of times with entire satisfaction. He finds the hemorrhage slight; the wound usually unites primarily, so that the patient is about in a week or ten days; there is no tendency to stricture nor any loss of sensation or control. Heitzmann² classifies all operations for piles under three heads—the

¹ British Medical Journal, 1910, vol. i, p. 17.

² New York Medical Journal, 1908, vol. lxxxviii, p. 1134.

ligature method, the Whitehead operation, with modifications, and the clamp and cautery operation.

The dangers of the ligature method are thrombophlebitis with embolism and death, as the result of puncture by a needle or a cut of a knife or scissors. Even with a clean field, the same result is possible, for thrombi are frequently found in the hemorrhoidal veins.

Objections to the Whitehead operation and its modifications are hemorrhage, resulting stricture of the anus, usual lack of primary union, loss of nerve supply, and consequent incontinence of feces.

The clamp and cautery operation is not attractive from a surgical point of view, but, if well done, arguments in its favor greatly outnumber those of other methods. The dangers of infection are at a minimum, since wounds are sealed by the cautery which at the same time destroys bacteria.

The steps of an operation favored by Heitzmann are described as follows:

Expose the tumors successively and hold between the thumb and finger, or with forceps. Carry the incision through the mucous membrane in the long axis of the bowel, and avoid wounding bloodvessels. Grasp exposed vessels and apply traction. The vessels are, as a rule, thus liberated; if not, separate them by blunt dissection with a curette or spoon from adhesions of connective tissue. After thorough exposure of the vessels, tie above and below with fine catgut, and remove with scissors or knife. The incision may be closed with catgut, or, if not large, it may be left unsutured. Redundancy of tissue may be removed by an elliptical incision, but great shrinkage may be expected. Dress with a simple pad over the anus. A boric acid drip keeps the field clear better than sponging. The operation is not applicable to the friable or capillary hemorrhoids, or to the connective tissue or cutaneous hemorrhoids. The advantages of this method are its simplicity, the slight hemorrhage, the comfort to the patient, the thorough coaptation of the edges of the incision, and hence prompt healing and absence of cicatrix. It gives a thorough removal of the cause of the hemorrhoid, not merely mucous membrane, hence there is a reduction of the liability of recurrence and of unfortunate sequelæ. This author's method is recommended as simple, clean, and complete. It is an advantage to remove a certain amount of skin in most chronic cases. I have practised for years a method very similar to this, and have described it in my *Minor Surgery*; but it is doubtful if any one can claim it as a new method. It is merely the application to a hemorrhoid of the usual principles applied to the removal of tumors in other parts of the body, viz., incision of the skin, excision of the tumor, ligation of bleeding points, and suture of the wound after removal of surplus skin, if such exists. The more faithfully these principles are

applied in operations for hemorrhoids, the better pleased will the operator and his patients be.

Delaup¹ crushes hemorrhoids with an angiotribe, applying the pressure several times in the axial line. The portion of the hemorrhoid that protrudes beyond the angiotribe is cut off flush by knife or scissors. The instrument should be reapplied as often as hemorrhage takes place. More than four applications to a single hemorrhoid are never required. After using this method in nearly two hundred cases, Delaup commends it as the best one he knows.

Hall² describes an operation for hemorrhoids, which consists in making a continuous double suture or harnessmaker's stitch under a clamp. The advantages are, that it requires only one hemostat, one tenaculum, one pair of scissors, curved on the flat, two needles, and some No. 2 catgut. After dilating the sphincter, the pile is drawn out with a tenaculum, if necessary, and a hemostat is applied well down on its base in the long axis of the bowel. Two needles are threaded on the two ends of a long strand of catgut; one is passed through the upper part of the pile at about an eighth of an inch from the proximal end and carried around the end and then back through the same hole from the same side, thus looping the thread at about its middle. Then both needles are passed through the pile close to the clamp, making a row of harnessmaker's stitches each about an eighth of an inch long. At the distal end the thread is drawn tight and tied around the lower edge. The pile is cut above the clamp and seared with a cautery, if one be handy. The after treatment consists of a suppository of opium and belladonna, a rectal plug of gauze and rubber dam wrapped about a piece of tubing, which is left in place for two or three days. After removal of the plug an oil enema is given. This operation has been variously described and practised.

Rectal Stenosis. McGavin³ condemns the clamp and cautery operation, and the Whitehead operation as often resulting in rectal stenosis. He looks upon the former as a relic of a crude age which is fortunately becoming obsolete. Whitehead's operation may result in stricture either (a) because of too few sutures or sutures which are tied too tightly, and so cut out too soon; or (b) the removal of too great a zone of tissue results in so much tension on the sutures that they are sure to cut out; or (c) the undermining of the cuff of mucous membrane and the accumulation of blood beneath it leads to suppuration. After discussing the other forms of stenosis, inflammatory and neoplastic, and the usual methods of treatment, McGavin calls attention to the success which has followed the use of *thiosinamine* in Dupuytren's contracture and specific stenosis of the gullet. He advises that it be

¹ Texas State Journal of Medicine, October, 1909.

² United States Naval Medical Bulletin, 1909, vol. iii, p. 22.

³ Clinical Journal, 1908-09, vol. xxxiii, p. 201.

tried in these rectal cases. The drug has worked favorably also, according to different writers, in pyloric stenosis and urethral strictures. In 1904, Merck, of Darmstadt, produced a combination of thiosinamine and sodium salicylate which he termed "*fibrolysin*," the addition of the latter drug having been made to save precipitation of the former from aqueous solution at low temperatures. The drug is injected into the gluteal muscles every second day, and most writers state that twenty-five to fifty injections are necessary to accomplish improvement.

The author condemns as pernicious any attempt at dilatation of rectal stricture by rectal bougies when there is ulceration present. He is a warm advocate of transverse colostomy when colostomy seems indicated, since mechanical control is easier here in the epigastrium, as is also the after toilet. He maintains that the transverse position of the colon at this point brings the dangers of constant extravasation and of prolapse of mucous membrane to a minimum, since it largely does away with the effect of gravity. He argues that many rectal cancers have caused infiltration and thickening of the mesosigmoid, making it sometimes difficult to bring the sigmoid into the wound. For the same reason it is at times difficult to use the rectus as a sphincter, and when it cannot be done, since the linea alba is a weak spot, the sphincteric action is lost. In stout patients the iliac region is frequently occupied by a fold of abdominal fat, which renders inefficient the application of a belt and pad. In emaciated subjects the prominence of the spine of the ilium covered by thin, stretched skin offers an opportunity for sloughing which is favored by frequent contact with fecal matter. On the other hand, the epigastric region is so supported by the prominence of the costal arches and liver, and the firm scaffolding of the rectus muscle, which is here thick and reinforced by two layers of sheath, that a patient is enabled to apply pressure to a belt which would cause great discomfort at the iliac region. It is possible to obtain a very efficient sphincter from the rectus muscle at this point, and here a belt may be well supported by shoulder straps. Lastly, in cases which are not malignant, and in which the short circuiting of the intestine may enable the surgeon to close the fecal fistula, the steps toward this end are simpler in the presence of a transverse colostomy than is the case when the opening has been made in the sigmoid.

Rogers¹ suggests an ingenious method by which to handle a stricture of the rectum two inches above the anus with perfect success. The stricture in the case described refused to admit the tip of the index finger. It seemed to follow hemorrhoids treated by an injection method with resulting abscess, and it had failed to improve after dilatation with bougies. The operation consisted in a semicircular incision in

¹ Boston Medical and Surgical Journal, 1909, vol. clx, p. 748.

front of the anus, followed by pushing back of the rectum and separation of the tissues by blunt dissection to a distance well above the stricture. Forceps were passed through the incision, to grasp the dilated rectum above the stricture, and their grasp was aided by a finger tip thrust through the anus and through the stricture. A loop of the dilated bowel was drawn down to the sphincter and with the forceps, and sutures were introduced through the lower margin and through the sides of this loop to the sphincter and lateral walls of the rectum respectively. Now, through the anus, held open by retractors, the double bridge of bowel wall thus formed in front of the rectum was cut through from the edge of the stricture down to the suture line, the angular cut forming a V with the apex below. Its cut edges were again sutured from the inside, and then the perineal incision was closed. The patient had a good bowel movement daily and was free from pain. At the time of report, one year later, examination showed no sign of recurrence.

Proctotomy for a Foreign Body. In order to remove a beer glass from the rectum of an intoxicated man, Combs¹ divided the sphincter muscles in the median line posteriorly. On account of extensive swelling and edema, and the presence of a discharge with gangrenous odor, the wound was allowed to heal by granulation, no sutures being inserted. The patient recovered with absolute control of his bowels. This method of treatment is advocated in similar cases in order to avoid the risk of extensive laceration of the soft tissues, which is likely to follow repeated attempts at extraction of a foreign body having sharp edges. In this case the glass had been introduced whole, but later it was broken by another physician during efforts of extraction. The drainage resulting from a single incision is not likely to be permanent. Such an incision enables the operator to not only remove the object with ease, but it permits him to inspect the injured area and to control bleeding vessels by ligature, and also to suture accidental wounds, if their non-inflamed state permits. There is no doubt as to the advisability of proctotomy in such cases.

Cancer of the Rectum. While there is so much uncertainty as to the best method of removing a cancer of the rectum, it is well to report the successes and failures of different surgeons with methods of their own devising. Some years ago Kraske's enthusiastic work in this hitherto neglected field of surgery led to his being followed by surgeons all over the world, and, for a time, Kraske's method and various modifications of it were the standard practice. But a form of operation that gave a mortality of about 20 per cent., even in the hands of those familiar with it, and which was followed by recurrence in about 80 per cent. of the survivors, could never be called satisfactory. Various attempts have been made to lessen the mortality and the percentage of

¹ Journal of the American Medical Association, 1909, vol. liii, p. 1395.

recurrences by combining an abdominal operation with the necessary perineal work in cases of cancer situated above the anus. The great difference in the plans of different operators lies in the way they restore the intestinal canal.

Swain¹ prefers a permanent iliac colostomy and removal of the lower part of the sigmoid, the rectum, and anus, together with the fat and lymphatic glands of the sacrum, in cases in which the situation of the tumor is so low that its thorough removal threatens sphincteric action. Otherwise he operates abdominally and brings the divided sigmoid through the anus.

Blake,² in a case in which the tumor lay above the pelvic floor but too close to it to permit safe anastomosis, tied and divided the superior hemorrhoidal arteries, identified the left ureter, and excised about eight inches of gut between ligatures together with the retroperitoneal tissue. An end-to-end anastomosis was performed, the ligatures being left in place, and for safety a left lateral inguinal colostomy was performed and a stab wound perineal drainage established. The ligatures and part of the suture line gave way, feces came through the drainage wound as well as through the colostomy opening, and, from the fourth day, through the anus. Both unnatural openings closed spontaneously and defecation became normal. Upon palpation a slight constriction was palpable six months later. There was no evidence of recurrence.

Amputation of the rectum by the method of Verhoogen³ is described as follows: The lower extremities are corded to save blood, the patient is put into a ventral position, and an incision is made from the base of the coccyx to the anus, which it surrounds. The sphincter is preserved, and later it is sutured. Then follows the dissection and the gradual bringing down of the rectum, which is sutured in the site of the anus. The divided sphincter is also sutured. There is drainage of the presacral space; elsewhere the wound is closed by suture. Of seven patients so operated upon, four healed by primary union with a continent anus, one healed by granulation with a too large and incontinent anus, and two showed a rapid recurrence of the tumor. This method of operating is quick and easy of performance.

Archibald⁴ makes a plea for the preservation of the pelvic floor, together with the sphincter, in cases in which the rectal cancer is situated anywhere between the pelvic floor and the promontory of the sacrum. He advocates an abdominal incision, division of the mesosigmoid, or at least of its lower half, division, cauterization, and suture of both cut ends of the sigmoid, and complete removal of the lower portion down to the upper margin of the sphincter. He then brings the upper

¹ Lancet, 1910, vol. i, p. 361.

² Annals of Surgery, 1910, vol. li, p. 261.

³ Revue de Chirurgie, 1909, vol. xl, p. 803.

⁴ Journal of the American Medical Association, 1908, vol. l, p. 573.

cut end of the bowel through the anus and stitches its mucous membrane to the cut edge of the anal mucous membrane.

There is no question that an operation of this character, leaving the pelvic floor intact, is accompanied by a minimum amount of hemorrhage and shock, and consequently by a greatly reduced mortality from sepsis. Nearly the whole of the procedure can be carried out by blunt dissection, after ligation and division of the sigmoid and superior hemorrhoidal arteries, and possibly the inferior mesenteric. An operation of this character nearly always requires some drainage. This can be accomplished by an incision between the anus and coccyx without threatening the vitality of the new rectum. When sloughing takes place in the latter, it is usually due to the fact that the mesosigmoid has not been sufficiently freed to permit the upper portion of the sigmoid to be brought to the anus without undue tension.

There is every reason to believe that an abdominal operation may be satisfactorily combined with the technique mentioned by Verhoogen. Certainly a clean incision and subsequent suture of the sphincter is less likely to be followed by incompetence than is an extensive blind cutting or tearing of the tissues around the portion of the rectum below the reflection of the peritoneum.

Peck¹ describes a technique which he has employed with satisfaction in two cases. It is purely the perineal operation, and is advocated for cases in which the tumor is situated below the middle of the sacrum, since in these cases the difficulty is to get beyond the disease in its immediate vicinity, and the abdominal operation is no help toward this end. With the patient in the lithotomy position, the anus was sutured. Then a median incision was made from coccyx to near the anus and prolonged to either side in the form of a Y. The rectum was then freed by blunt dissection above and below the growth, doubly ligated with tape, divided with the cautery, and the tumor removed. The peritoneum was then opened and the dissection continued to the promontory. The anus and sphincter were then cut through posteriorly, the anal mucous membrane was excised, and the cut end of upper bowel brought out for two inches beyond the anus and its peritoneal surface sutured to the skin about the anus. The posterior wound was then closed in its greater part and drained in its upper angle. The ligature around the bowel was left in place for forty-eight hours and then removed. Healing took place without any fecal leakage and was largely primary. Sphincteric control was well preserved.

In the discussion of this paper, Kammerer said he had abandoned resection of the rectum for excision, and for the past five or six years he had established a permanent inguinal anus in every case of cancer of the rectum, even of the uppermost portion. After two or three

¹ *Annals of Surgery*, 1910, vol. li, p. 242.

weeks, during which time the rectum was irrigated daily with saline solution, he removed the tumor by a posterior or sacral incision. The change in the patient during this period and the increased mobility of the tumor are points not sufficiently emphasized in modern surgical literature. At the second operation he removed the whole anus and rectum to a point well above the tumor, and then stitched the sutured stumps of the rectum into the wound in Douglas' cul-de-sac. It gives the patient no trouble, and does not need to be brought to the original site of the anus.

Hartwell favored excision of the whole rectum for any carcinoma that can be reached with the finger. He has collected reports of fifty cases operated upon by seventeen surgeons, and found that after three years the cures were less than 20 per cent.

New Operative Procedure for the Reconstruction of the Sphincter Ani. Schoemaker,¹ dissatisfied with the methods of Gersuny, Witzel, and of Lennander in restoring continence to a damaged rectum, devised a new method, which he practised on the cadaver and then applied successfully to his patient. He put the patient on his stomach, with the legs hanging down over the table. He made an angular incision on either side as follows: From a point two fingers' breadth from the median line on a level with the tip of the coccyx he made a straight incision parallel with the median line for 10 cm., then cut at an obtuse angle for another 10 cm. to the side as far as the outer border of the femur and to a point a hand's breadth from the great trochanter. This thin flap was swung outward. Then a bundle of the muscle fibers of the gluteus maximus, 3 or 4 cm. wide, was separated from the rest of the muscle and cut off below. When this flap was raised, it was possible to see its nerve distribution coming from the depths of the pelvis. He next separated the tissues in front of and behind the rectum, and obtained on each side of this organ a sort of tunnel through which he passed his muscle flaps, sewing with a simple silk suture. The incision was closed without drainage.

The result was perfect. Six weeks after operation the patient could retain an enema of 30 grams of glycerin without difficulty, and could hold natural dejecta; later, at about nine weeks, she could energetically contract the muscles which constituted the new sphincter at will.

Anal Fissure Treated by High Frequency Currents. Delherm² claims marked advantage in the treatment of anal fissure by high frequency currents. He claims success for this method in 90 per cent. of cases. In summing up and comparing the results with those of other methods, he claims for it:

¹ *La Semaine Médicale*, 1909, vol. xxix, p. 160.

² *Archives des Maladies de l'Appareil Digestif*, 1908, vol. ii, p. 714.

1. An absence of risk.
2. The possibility of applying it in all conditions, even in the presence of inflamed piles.
3. An avoidance of operation.
4. It is easy to perform.
5. It does not immobilize the patient.
6. It gives rapid results, improvement being marked in from three to five treatments.
7. It has proved very efficacious in the hands of numerous surgeons.
8. The results are lasting.
9. The treatment cures or improves concomitant local affections, such as inflamed hemorrhoids.
10. It is favorable to general health.

Not until treatment by high frequency currents has been tried and failed should dilatation be resorted to. Delherm uses a special electrode, which is introduced into the anus. Treatment is made daily at first, then every other day. "If marked relief is not accomplished in eight treatments they should be omitted for a time, to be resumed later if a cure does not occur in the meantime, as often happens."

While this form of treatment may doubtless be well adapted to certain individuals and to certain inflamed conditions, it offers little promise of supplanting the well-known treatment by simple dilatation under a general anesthetic. Nitrous oxide gas suffices in many cases if it is well given and the operator exercises care not to proceed too rapidly in his dilatation.

THE LIVER AND BILIARY PASSAGES.

Some Points in the Technique of Operations. CONTROL OF HEMORRHAGE. In cases of extensive traumatic hepatic hemorrhage, Pringle¹ obtains absolute temporary hemostasis by *compression of the portal vein and hepatic artery* as they lie in the free edge of the lesser omentum. The fingers of an assistant accomplish this, thereby enabling the operator in an unhurried and thorough manner to deal with whatever conditions he finds. In animal experiments, no ill effects were caused by this transient obstruction of the portal circulation, hemostasis was perfect, and recovery after amputation of one lobe of the liver was uneventful. The longest time for keeping the portal vein closed was one hour.

In *suturing the torn liver*, Pringle prefers the method originally described by Kusnetzoff and Pensky. This is done by passing ligatures through the liver substance at a sufficient distance from the margins of the wound to make certain that they will not slip, and by pulling these up as tight as possible, allowing them to cut into the liver tissue;

¹ *Annals of Surgery*, 1908, vol. xlviii, p. 541.

the coats of the vessels in the liver are sufficiently resistant to permit this being done without giving way themselves. Any subsequent oozing is easily controlled by packing.

Since these experiments were made, two patients with ruptured liver were operated on by this author. In each case, the hepatic and portal vessels were grasped between fingers and thumbs as soon as the abdomen was opened, while blood clots were removed and the necessary manipulation of the liver was carried out. In both cases the method proved perfectly satisfactory, giving perfect control of the bleeding areas of the liver and a clear field for operating. One of the patients died on the table. In the second case the rupture of the liver was so far up and back on its convex surface that even partial division of the ligaments of the liver did not permit exposure of the wound. It was, therefore, packed with gauze. This patient died two days later from gangrene of the right lung, probably due to embolism. It has been shown experimentally that embolism of the pulmonary vessels consequent upon thrombosis of the hepatic vessels is both common and fatal. In Pringle's case, the autopsy showed that there had been no further hemorrhage from the liver.

Kehr uses digital compression when bleeding from the cystic or hepatic arteries occurs during gallstone operations. The patency of the foramen of Winslow greatly facilitates this procedure. No ill effects from consequent congestion of the portal system have occurred.

Ligation of Hepatic Artery. Total necrosis of the liver follows ligation of the hepatic artery under normal conditions. This old physiological fact is not contradicted by Kehr's¹ successful ligations of the artery; once for aneurysm, once for uncontrollable hemorrhage from the cystic artery following a choledochotomy. Kehr² considers that the gradual growth of the aneurysm afforded time for the formation of an adequate collateral circulation; and, in his other operation, which was one of necessity, he believes a sufficient arterial supply reached the liver, either through the dense adhesions present at both lobes, or by an accessory vessel in the lesser omentum.

In an excellent article on "Aneurysms of the Hepatic Artery," Villandre³ reports experiments on dogs confirming Kehr's observations. He finds that while a gradual closure of the artery followed by complete arrest of circulation does not lead to necrosis of the liver, on the other hand, sudden closure of the normal artery by an embolus or ligature is always fatal.

Of about 38 cases reported in the literature,⁴ the patient of Kehr

¹ *Technik der Gallenstein Operationen*, 1905, chapter on Aneurysm of the Hepatic Artery.

² *Münchener med. Wochenschrift*, 1909, p. 237.

³ *Archives Générales de Chirurgie*, Paris, 1909, vol. iii, pp. 111 to 220.

⁴ Bode, *Beiträge zur klinischen Chirurgie*, 1909, vol. lxiv, p. 516.

is the only one cured and living. In this connection, Ransohoff's findings¹ are worthy of mention. He reported a fall in blood pressure of from 20 to 40 mm. of mercury immediately following introduction of the finger into the foramen of Winslow, both in a patient suffering from stone in the common duct and in animals. While this shows that gentleness of technique is a great desideratum in all procedures near the porta hepatis, after all it is a relative matter and does not furnish any positive contra-indications.

In his article on "Surgery of the Bile Tracts," Munro² gives the most recent and acceptable résumé of the entire subject. His conclusions are as follows:

1. An analysis of our cases demonstrates that jaundice is present in a majority of all, even the simple gall-bladder cases at some time; that a very large majority of common duct cases have jaundice.

2. That the pancreas is frequently pathological, as determined by the examination of the open abdomen.

3. That adhesions are present in a large majority of cases, and may be the direct cause of symptoms rendering all medical treatment more than futile.

4. That pulmonary complications must be reckoned with in prognosis, but that they are less frequent than anticipated.

5. That cholecystostomy is normally a more suitable operation than cholecystectomy, unless the gall-bladder is definitely functionless.

6. That recurrence of symptoms may be due to adhesions or to a contracted gall-bladder as well as to overlooked stones.

7. That toxemic cases are best treated medically until the acute state has passed.

8. That fatal capillary hemorrhage may be controlled, to an extent not yet determined, by the use of fresh animal serum.

He states, in referring to the toxemic cases, that the patients do not die from shock, but die with a high pulse and temperature, delirium or stupor, and apparent cessation of hepatic functions. If such patients were operated upon at the time, as a rule, no fresh bile was found in the common duct, and they went on to a fatal termination. Munro treats such septic, jaundiced, emaciated patients as suffering from general sepsis, and waits "until the storm has passed." If, while waiting, there is an exacerbation of sepsis and jaundice, he operates immediately and thus far with success.

The *prophylactic injection of serum* seems to prevent capillary hemorrhage following long standing jaundice. Munro mentions 15 or 20 cases where serum was given twenty-four hours before operation. In 1 or 2 a little oozing continued which was checked by the use of more serum. The dose is from 20 to 30 c.c. of normal rabbit or horse serum

¹ Annals of Surgery, October, 1908, vol. xlvii, p. 550.

² Boston Medical and Surgical Journal, 1909, vol. clx, p. 359.

injected subcutaneously at some convenient spot. Horse serum is most available in the form of *fresh* diphtheria antitoxin.

Leary,¹ at whose suggestion Munro tried this, has reported a series of serum injections for various hemophilic conditions, and among them a number of cases of jaundice occur.

Quenu² has used fresh diphtheria antitoxin (20 c.c. the day before operation) as a prophylactic since March, 1907. The results are good. Wirth³ communicates a series of investigations on this subject.

A most interesting case is reported by F. T. Murphy,⁴ of Boston, where, in the absence of prophylactic serum treatment, a general capillary oozing began and continued in spite of repeated serum injections. As a last resort the practically exsanguinated patient was transfused, the husband acting as donor. Bleeding promptly stopped and she made an uneventful recovery. Notwithstanding this successful case, it must be remembered that except in cases of extreme urgency, no transfusion should be performed without the precaution of previous tests for hemolysis and agglutination.

Re-establishment of the Biliary Passage. In 1904 Monprofit⁵ performed the first *cholecystenterostomy en Y*. His procedure was similar to that of the gastro-enterostomy *en Y* of Roux, with the difference that he substituted the gall-bladder for the stomach. That is, he divided the jejunum some distance from the duodenojejunal junction, and made an end-to-side anastomosis by implanting the oral end of jejunum into the side of the anal segment well away from its free cut end. This leaves a length of jejunum through which no food passes. Its upper end is closed and is approximated by its side to the fundus of the gall-bladder (Fig. 9), thus reestablishing a biliary passage in cases of loss or closure of the common duct.

To use Monprofit's own words, "a segment of jejunum constitutes a new common bile duct, a reflux of intestinal contents into the gall-bladder is avoided, and the possibility of an ascending infection is prevented." This form of cholecystojejunostomy has been successfully performed by Monprofit⁶ in 1904 and 1908, by Moynihan in 1905, by Delageniere in 1907, by Docq in 1907, and by Rotgaus and Cholin⁷ in 1909.

Recently Monprofit⁸ has again performed a "Y" cholecystenterostomy, this time in a case of inoperable cancer of the head of the pan-

¹ Boston Medical and Surgical Journal, 1908, vol. clix, p. 73.

² Revue de Chirurgie, 1909, vol. xxxix, p. 245.

³ Zentralblatt der Grenzgebiete d. Med. u. Chir., 1909, vol. xii.

⁴ Boston Medical and Surgical Journal, 1908, vol. clix, p. 866.

⁵ Archives Provinciales de Chirurgie, 1904, vol. xiv, p. 383.

⁶ Archiv. Internat. de Chir. Gast. Entest, 1909, p. 28; British Medical Journal, 1908, vol. ii, p. 991.

⁷ Zentralblatt f. Chirurgie, 1909, p. 1767.

⁸ Revue de Chirurgie, 1909, vol. xl, p. 799.

creas, choosing a loop of jejunum for the purpose, as before. Icterus disappeared, and there was no evidence of intestinal regurgitation into the bile ducts, nor infection in them. The patient was alive at the time of report, more than a year after the operation. His death was expected soon, however, as the cachexia was marked, but there was no return of symptoms of biliary obstruction.

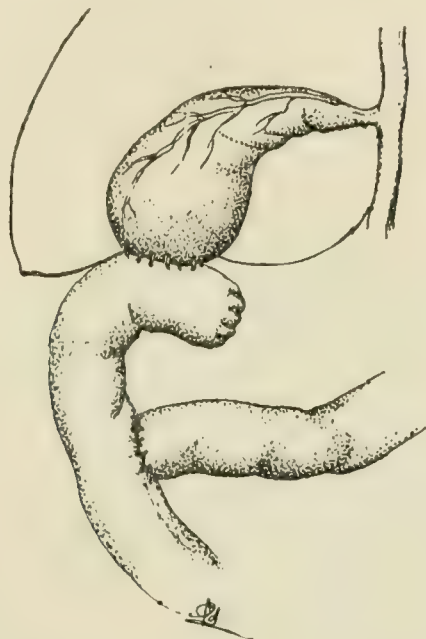


FIG. 25.—Cholecystenterostomy en Y. (Monprofit.)

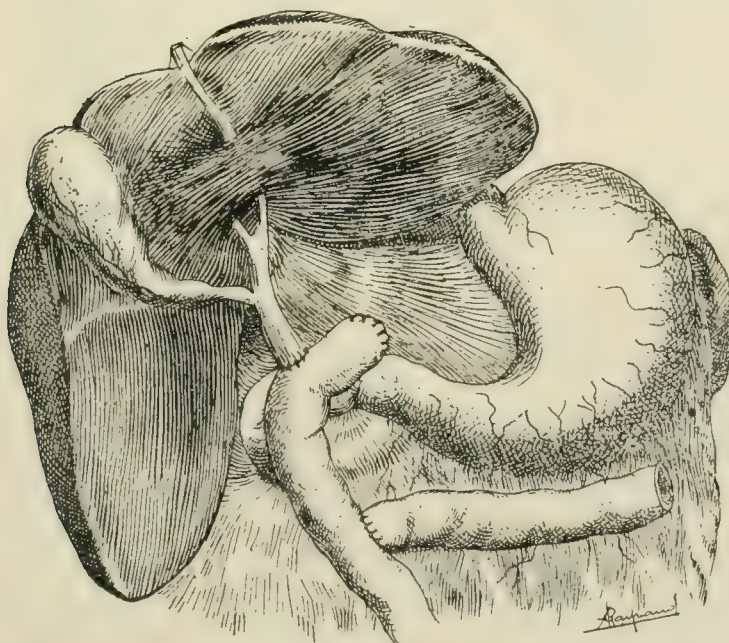


FIG. 26.—Choledchoenterostomy en Y for obstruction at the ampulla of Vater. (Monprofit.)

In one of his earlier papers Monprofit further suggested that any part of the biliary system could be connected with the intestine by this method, namely, choledchoenterostomy (Fig. 10), and hepatico-

enterostomy (Fig. 11). This hepaticenterostomy has been successfully performed by Dahl¹ (May 7, 1908) and Lanphear² (February, 1909), each independently. In both instances the common bile duct had been rendered functionless by inflammatory process, making it imperative to reestablish connection with the intestine. Neither Dahl nor Lanphear made any reference to Monprofit's priority of idea. So far as known, both patients are doing well. In case the larger bile passages are unavailable, either because of congenital absence or as a result of inflammatory or neoplastic process, the blind jejunal end is sutured over a distended bile capillary on the surface of the liver itself (Fig. 12). Two points in the technique demand

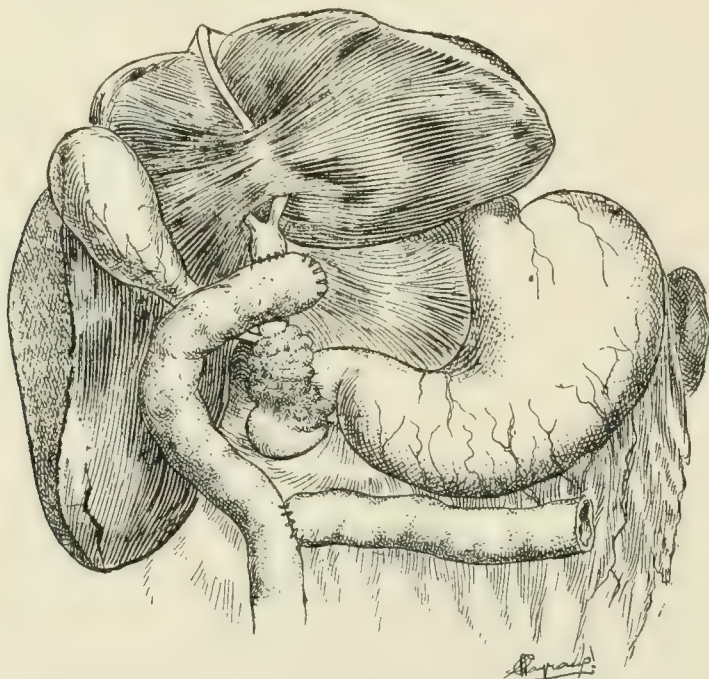


FIG. 27.—Hepatico-enterostomy en Y. (Monprofit). Note dilatation of ducts caused by obstructing tumor.

especial attention: (1) When circumstances indicate, especially in common and hepatic duct cases, the jejunum is brought through an opening made in the transverse mesocolon to the right of the stomach. (2) The anastomosis between the blind jejunal end and bile passages is made, in all cases, through a lateral opening in the former. (See Diagrams.) Usually the same circumstances furnishing occasion for this type of operation cause extreme dilatation of those biliary tracts which still functionate, and make their anastomosis with the gut much easier than under normal conditions.

The extreme likelihood of liver infection, which exists in the presence of internal biliary fistula occurring as a result of suppurative processes, has been repeatedly observed. The close proximity of an intestine

¹ Zentralblatt f. Chirurgie, 1909, p. 266.

² Surgery, Gynecology, and Obstetrics, April, 1909, p. 406.

filled with bacteria-laden material, and the absence of any valve-like protecting mechanism, normally afforded by the papilla of Vater, have given rise to cholangitis in the majority of instances. In fact, those cases where a spontaneous communication between the bile passages and either stomach, duodenum, large or small intestine had occurred, were frequently brought to medical notice by subsequent ascending infection.

Ehrhardt operated upon a child six weeks old suffering from congenital aplasia of all the large bile passages. He attached an upper jejunal loop to the liver. Death occurred four days later as a result of enteritis, as shown at autopsy.

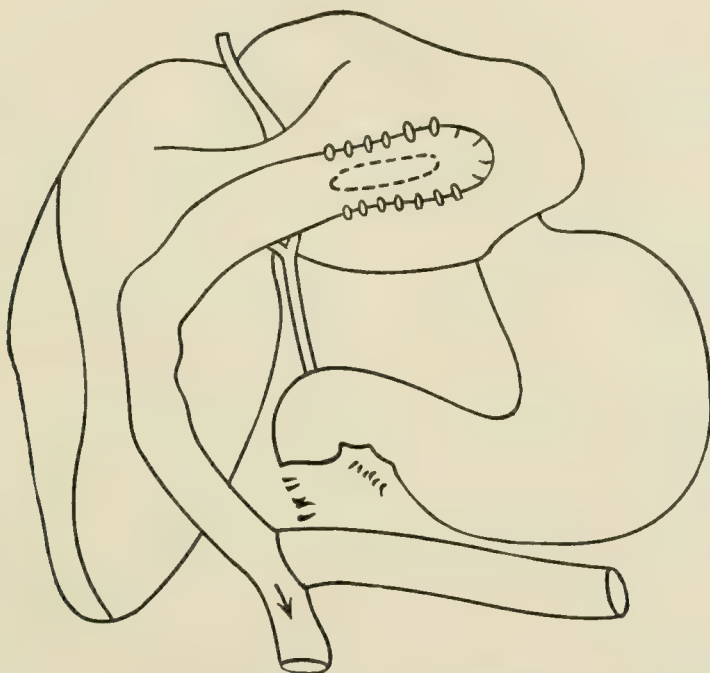


FIG. 28.—Hepatocholeostomy en Y. (Monprofit.) This illustrates the method of lateral opening into the jejunum.

A successful operation is mentioned by Garre.¹ His patient was a man, aged thirty-six years, whose hepatic duct was ruptured by traumatism. It healed with stenosis, for which he was several times operated upon. Finally, on February 25, 1905, the duodenum was opened and sutured to the surface of the liver. Three years later the patient was well and free from fever or icterus.

Lejars² operated upon a woman, aged fifty-five years, who suffered from old inflammatory occlusion of the bile ducts, performing an hepatocholeoduodenostomy. Three days later there was sudden high fever, with death on the following day. The autopsy showed no peritonitis and a healed suture line. This was probably a case of liver infection.

¹ Beiträge z. Physiologie u. Pathologie, 1908, p. 22.

² La Semaine Médicale, 1909, p. 121.

Recently, Kehr¹ stated that he had observed some 70 cases of fistulæ between the biliary system and the intestinal tract without seeing any success from such attempts at healing. Usually, the gall-bladder emptied itself, but the stones stayed in the common duct. He concluded by saying that through these fistulæ the biliary system becomes infected, thereby putting the patient's life in grave jeopardy.

Of the 6 patients upon whom hepatocholelenterostomy is known to have been performed, 1 is alive and well.² Of the remainder, 2³ were not autopsied, 2 died after operation from peritonitis⁴ and enteritis,⁵ respectively, and 1 succumbed to an acute ascending infection of the liver some seventy-two hours after operation.⁶ It would be useless to draw conclusions from such varied and scanty material.

Thanks to the work of Cushing,⁷ the fact has been established that the upper intestinal tract is practically sterile as soon as empty. Therefore, this "procédure en Y" seems to be a safer method against ascending infection than anything previously attempted, while its mechanical advantages in reaching any part of the biliary system are so apparent that no further mention is needed.

The implantation of the common bile duct into the duodenum, following stenosis at the papilla of Vater, while far simpler, has the same objection of liability to ascending infection.

Sullivan⁸ resected the lower part of the common duct in dogs and reestablished communication by a rubber tube, attached above to the duct by absorbable sutures and projecting below into the duodenum through a snug opening. The omentum was then utilized to cover the tube. A gauze sponge attached to its duodenal end assured the tube's withdrawal into the intestine as soon as the retaining sutures at its upper end were absorbed. Thus, a passage through the omentum was left to connect the bile tracts with the duodenum. This imitates many spontaneous biliary fistulæ, parts of whose walls are composed of adherent omentum, and also shares their liability to ascending infection. The conditions under which such a common bile duct would be needed in actual practice were not reproduced. It is one thing to do this with the tissues of a healthy dog, and quite another to construct a new channel amid inflammatory and cicatricial tissue left after the sloughing away of a common bile duct in man.

Dilated, Wandering, and Strangulated Gall-bladders. A gall-bladder so dilated that it occupies most of the abdominal cavity is very rare.

¹ Archiv f. klin. Chir., 1909, Band lxxxix, p. 150.

² Beitrage z. Physiologie u. Pathologie, 1908, p. 22.

³ Zentralblatt f. Chirurgie, 1904, p. 185; Annals of Surgery, 1905, vol. xli, p. 56.

⁴ Mittheilungen aus den Grenzgeb. d. Med. u. Chir., vol. ix, p. 662.

⁵ Zentralblatt f. Chirurgie, 1907, p. 1226.

⁶ La Semaine Médicale, 1909, p. 121.

⁷ Boston Medical and Surgical Journal, 1909, vol. clx, p. 203.

⁸ Journal of the American Medical Association, 1909, vol. liii, p. 776.

To the three cases previously published,¹ Collinson² adds a fourth. His case was that of a woman, aged thirty-one years, "with no particular ailment excepting a large abdomen." She had been tapped twice before coming under his care. Each tapping yielded twenty-five pints of fluid. After careful physical examination he diagnosed an ovarian cyst. At operation, an enormously distended gall-bladder, having many dense adhesions, was found. It contained twenty-two pints of liquid. The greater part of this adherent sac was excised, and the remainder was sutured to the integument and drained. The cystic and hepatic ducts were not explored because the patient's poor condition hurriedly terminated the operation. She subsequently recovered.

The condition is so rare, and from a diagnostic standpoint so interesting, that it seems worth while to give a short résumé of the other cases.

CASE I.—Terrier³ reports the case of a woman, aged fifty years, with a large fluctuating tumor which had previously been tapped to relieve dyspnea. A diagnosis of ovarian cyst was made. At operation, a huge adherent gall-bladder was emptied of forty-two pints of liquid, a stone impacted in the cystic duct was removed, most of the bladder wall was resected, and the remainder was sutured to the skin for drainage. The patient recovered.

CASE II.—Lawson Tait⁴ operated upon a woman, aged forty years, for this condition, making a diagnosis of ovarian cyst. The operation was similar to that of Terrier's. The gall-bladder was found to contain eleven pints, and a stone was impacted in the cystic duct. The patient reported herself well two years later.

CASE III.—Gersuny⁵ observed a woman, aged fifty years, who complained of attacks of colic, with the development of a large right-sided abdominal tumor within a few weeks. Examination revealed a fluctuating mass occupying the right abdomen, reaching past the median line to the left, and extending from the costal margin to the inguinal region. Dyspnea due to compression of the right lung was present. There was no icterus. The diagnosis of a ruptured gall-bladder was made, because the mass was connected with the liver and bulged into the right loin. Through a lumbar incision, an enormous quantity of bile-stained fluid, in which were many gallstones, came away. Gersuny reported, in a subsequent personal communication to Doran, that a part of the cyst wall had been excised, and by microscopic examination proved to be the wall of the gall-bladder. Although a fistula developed, the patient was alive and well ten years later.

¹ British Medical Journal, 1905, vol. i, p. 1516.

² Ibid., 1909, vol. i, p. 1294.

³ Bulletin de l'Académie de Méd., 1890, vol. xxiv, p. 831.

⁴ Lancet, 1889, vol. i, p. 1294.

⁵ Wiener med. Wochenschrift, 1894, pp. 2046 and 2098.

Erdmann,¹ in Bessarabia, had a case probably representing the same condition. The patient was a man, aged twenty-four years, suffering from extreme abdominal distention, without jaundice. Puncture in the median line gave 60 to 80 pounds of bile-stained liquid. There was no reaccumulation. He left the clinic well and was lost track of.

In reviewing these reports, it is observed that in no case was there jaundice, most of the patients were women, and the cause was usually attributed to impaction of the cystic duct by stone.

Smaller distended gall-bladders are somewhat less rare than the foregoing, and have also been mistaken for ovarian cysts. Doran² reports such a case, in which the gall-bladder contained one and three-quarters pints of liquid. He evacuated the contents through an opening in the fundus, excised an impacted stone in the cystic duct, sutured both incisions, and closed the abdomen without drainage. Recovery followed. The reader is referred to Doran's article for the literature of these cases.

Two cases of "*wandering*" gall-bladder, only attached to the liver by a slender cystic duct, were published by Krukenberg³ in 1903. He believed occasional kinking of the pedicle caused attacks of "gall-stone colic." This condition has also been described by Köhler, Kehr, Riedel, and Cabot. The organ was not enlarged.

Gangrene, following torsion of such a gall-bladder, was recently reported by Nehr Korn⁴ in a woman, aged seventy-four years. She had been healthy until eight days before operation, except for frequent digestive troubles in youth. Her attack began with severe pain in the right hypochondrium and back, soon followed by obstipation and vomiting, with rapid decline in general condition. Examination revealed an abdomen moderately distended, with an exquisitely sensitive tumor the size of a man's fist in the region of the gall-bladder. At operation, Nehr Korn exposed a gangrenous gall-bladder surrounded by adhesions of omentum and intestine. After freeing these, the gall-bladder was found attached to the liver by a slender pedicle which had undergone one complete twist. The cystic duct was then ligated and the gall-bladder removed. After this, neither subsequent operative procedure nor postoperative conditions were stated in the report.

Mühlsam⁵ still more recently has reported torsion of the gall-bladder. A woman, aged sixty-one years, ill only four days, came to him with fever, a large tender mass in the right hypochondrium, and peritonitis. At operation, the dark red, friable gall-bladder was found to be twisted 360 degrees on its pedicle. Cholecystectomy was done, and the patient recovered.

¹ Virchow's Archiv, 1868, vol. xliii, p. 289.

² British Medical Journal, 1905, vol. i, p. 1516.

³ Berliner klinische Wochenschrift, 1903, p. 667.

⁴ Deutsche Zeitschrift f. Chirurgie, vol. xevi, p. 319.

⁵ Berliner klinische Wochenschrift, 1909, p. 1179.

I recently operated upon a woman, aged forty-five years, who had suffered for four days from vomiting and pain in the right side of the abdomen. A tumor was felt, reaching from the right hypochondrium to the appendicular region, where there was a small adherent hernia in the old scar of an operation for appendicitis. The tumor consisted of a greatly distended gall-bladder twisted on itself about one-half turn around the omentum. It was not yet gangrenous but its wall was dark red and edematous. It was freed, stitched to the abdominal wall and opened. Several ounces of mucopurulent fluid containing streptococci and sixty-seven gallstones were removed. The patient made an excellent recovery.

Dilated Common Duct. Idiopathic cystic dilatation of the common duct to the size of a man's head was reported by Ebner¹ before the *Deutsche Gesellschaft f. Chirurgie*, 1909. This patient, like those of Dreesman, reported in *PROGRESSIVE MEDICINE*, June, 1909, died of a fulminating purpura hemorrhagica some time after operation. Bakes, in the discussion which followed, reported the only case thus far known in which the patient is living, cured of this condition. The cure was brought about by means of a choledochenterostomy.

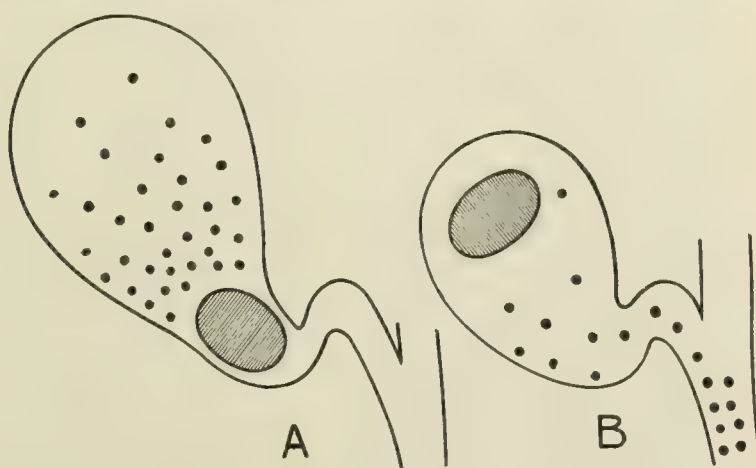


FIG. 29.—Diagram to show ball valve action of large gallstone. A, stage of cholecystitis; B, stage of colic and jaundice. (Carwardine.)

Gallstone Acting as a Ball Valve. The “ball-valve” action of a gallstone is well recognized, but it seldom is as plainly marked as it was in a case reported by Carwardine.² The gall-bladder contained a large stone and several smaller ones, which shifted their position so as to produce alternating cholecystitis and biliary colic. When the large stone occluded the cystic duct, no small stones escaped. When it became displaced, small stones passed into the common duct and gave rise to biliary colic. Such, at least, was the explanation given by Carwardine, and it seemed to be warranted by the known facts. The patient was

¹ *Zentralblatt f. Chirurgie*, 1909, Beilage, p. 98.

² *British Medical Journal*, 1910, vol. i, p. 66.

a man, aged fifty-five years, who during the previous years had two attacks of "indigestion" marked by vomiting without jaundice, but with enlargement of the gall-bladder. At the end of the year he had several slight attacks, and then a severe one, followed by jaundice, but without enlargement of the gall-bladder. Several small gallstones were discovered in the feces. After the recurrence of both kinds of attacks, he submitted to operation. Thirty small friable stones were removed from the gall-bladder, and also a large ovoid stone from the neck of the bladder, where it blocked the cystic duct. On its removal, bile flowed into the gall-bladder. The possible varying conditions are clearly shown by the accompanying diagram (Fig. 13).

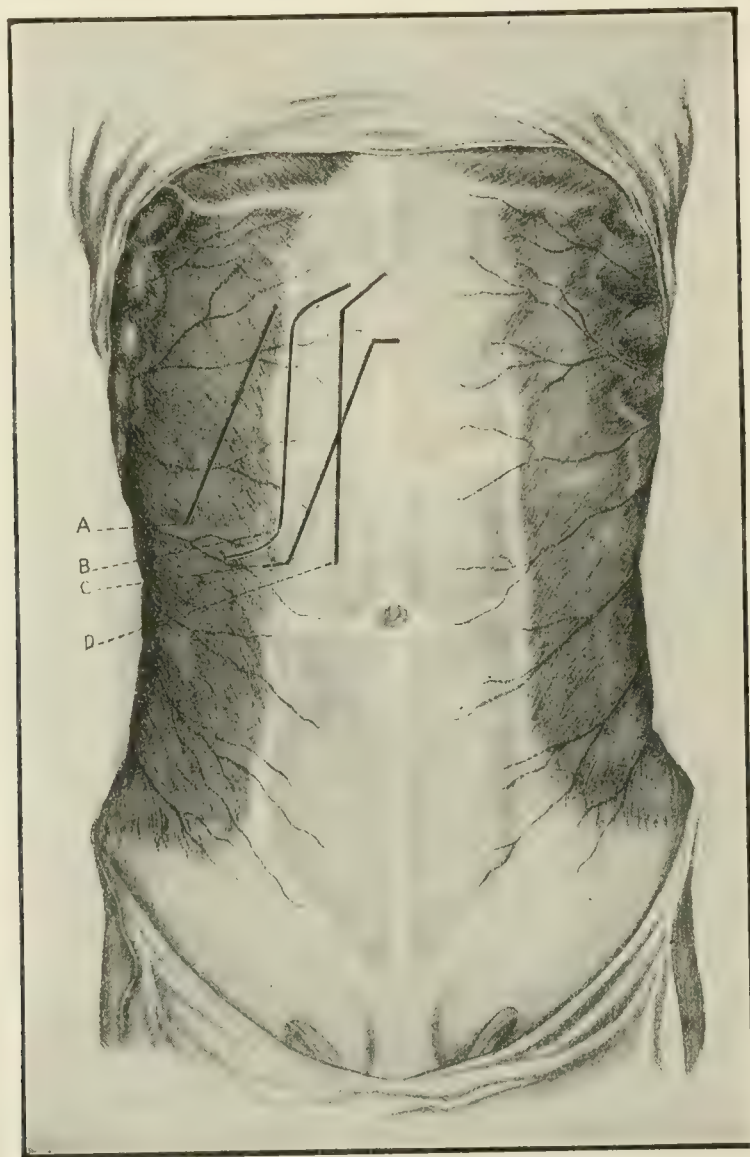


FIG. 30.—A, Kocher's incision. B, Bevan's incision. C, Collins' incision. D, Mayo-Robson's incision. (Collins.)

A Good Incision for the Bile Tracts. An incision for the bile tracts which begins at the inner edge of the right rectus muscle one or two inches from the ensiform cartilage, and extends diagonally downward

and outward to the outer edge of the right rectus close to the level of the umbilicus has been employed by Collins a number of times, with complete satisfaction. It cuts through the skin, fat, and anterior wall of the sheath of the rectus (Fig. 14). A short transverse incision about one inch in length may be made inward from the upper end of the diagonal incision through the skin, fat, and linea alba; and a similar one through the linea semilunaris at the lower end. In case more room is required, the upper transverse incision may be extended farther into the anterior and posterior walls of the sheath of the left rectus muscle.

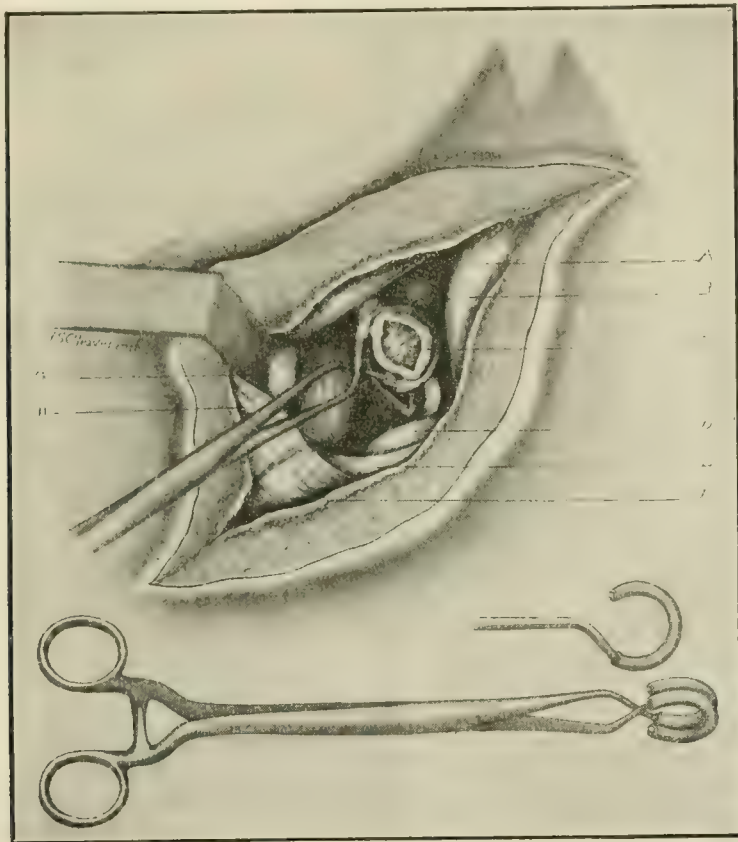


FIG. 31.—A, rectus muscle. B, stomach. C, common duct with stone. D, duodenum. E, posterior wall of the sheath of the rectus muscle. F, anterior wall of the sheath of the rectus muscle. G, gall-bladder. H, rectus muscle. The stone and duct are held up close to the surface with the forceps. (Collins.)

The rectus muscle is then separated from its sheath. It is easily separated from the posterior portion of its sheath by blunt dissection, but the anterior portion presents some difficulty at the insertion of the lineæ transversæ, one of which is found about midway between the ensiform cartilage and the umbilicus, and is crossed by this incision. The attachment of the muscle to the anterior wall of its sheath is very close at this linea transversa, and requires sharp dissection with knife or scissors.

When the muscle is thoroughly freed from its sheath, except at its outer border, it is easily retracted outward and allows the posterior wall of its sheath and the peritoneum to be incised in the same direction as the skin and anterior wall. The upper end of this diagonal incision

through the posterior wall extends into the short transverse incision across the linea alba. When this last cut is made, the incision falls open and gives ready access to the right upper abdomen. Any operation on the bile tracts may be done through it, and it easily permits of operations on the stomach, such as gastro-enterostomy, pyloroplasty, and resection of the pylorus. So far, those who use this incision have not found it necessary to adopt Mayo Robson's expedient of elevating the spine.

The openings through the aponeuroses of the rectus muscle are thoroughly protected by the uninjured muscle which lies between them, while the intercostal nerves that supply the muscle are not interfered with in any way.

Collins has also devised a forceps which will seize and hold a stone in the common duct (Fig. 15).

"Formalage" of Echinococcus Cysts. From Quenu's clinic Candoix¹ reports upon the preoperative "formalage" of echinococcus cysts of the liver. Upon exposure, a 1 per cent. solution of formalin is injected into the cyst. Then an interval of five minutes elapses before further operative procedure. Quenu believes this suffices to sterilize all parts of the cyst which may be capable of reproduction, and thus to remove all possibility of scattering the "seeds" of the cyst should it be ruptured and the fluid escape during its removal.

Cancer of Papilla. Kausch² has had good success in operating upon cancer starting in the opening of the bile duct in the duodenum. He performs his operation in two sittings, at the first of which he establishes an anastomosis between the gall-bladder and the intestine. This relieves the patient from the obstructive biliary symptoms, and two months later, when the jaundice has entirely disappeared, the middle portion of the duodenum is removed. The steps of the operation are as follows: Mobilization of the duodenum, posterior gastro-enterostomy, closure of the pylorus, ligation of the common bile duct, division of the pancreas including the pancreatic duct, removal of the affected portion of the duodenum. The open end of the duodenum is drawn over the cut surface of the pancreas and sutured. The ligated end of the bile duct is also placed within the duodenum. In this way, any biliary or pancreatic secretion will flow into the intestine. Temporary drainage, however, is established, and in the case reported by Kausch there was some escape of gastric biliary and pancreatic fluids for a period of seventeen days. His patient made a good recovery.³

¹ Zentralblatt f. Chirurgie, 1909, p. 22.

² Ibid., 1909, p. 1345.

³ Reference to the article on "Pancreas," in PROGRESSIVE MEDICINE of June, 1908, pages 133 to 136, will give a good idea of the relation of the structures involved in this operation, although the technique employed by Kausch is somewhat different from that employed by Sauve, from whose work the illustrations there used were reproduced.

THE PANCREAS.

Pancreatic Necrosis. ETIOLOGY OF PANCREATIC NECROSIS. In an attempt to determine the cause or causes of pancreatic necrosis, various animal experiments have been carried out, and from them much light has been thrown upon this very obscure organ and its physiology. Amid the uncertainty of much experimental work there stand out clearly three methods of producing necrosis artificially.¹ The first is the injection of sterile olive oil into the chief pancreatic duct. The production of necrosis is accompanied with vomiting, subnormal temperature, collapse, cramps, and sudden death—symptoms closely akin to those which accompany acute pancreatic necrosis in man. There is found also, accompanying the necrosis, a sterile bloody ascites. The injection of fatty acids and soap produced the same result; but the injection of glycerin was without injurious effect.

The second means of producing pancreatic necrosis is the ligation of *all* the pancreatic ducts at the height of digestion. Such conditions might arise in man if a gallstone becomes impacted in the lower part of the common duct at the height of digestion; or if a person takes a full meal just after such impaction occurred.

The third method of producing pancreatic necrosis artificially is by the injection of bile into the pancreatic duct. It is known that this back flow of bile into the pancreas may occur in man when a gallstone becomes impacted in the duodenal papilla.

DIAGNOSIS OF ACUTE PANCREATITIS. Without going farther into the etiology of this interesting subject, a few words as to the diagnosis of acute pancreatitis may help in the early recognition of this most acute of all surgical abdominal torsions. Perforative peritonitis, and a high intestinal obstruction are the two essential subjects of differential diagnosis. Unfortunately, we have as yet no positive means of differentiating them sufficiently early to permit of saving life by an early drainage and tamponade. Glycosuria is a very uncertain sign both in man and in animals. The diagnostic value of leukocytosis is not yet established.

Cambridge's reaction, at first hailed as a certain test, but later discredited by many, is again the subject of considerable dispute.

During the past year, opinions in regard to it have crystallized into something like the following:

1. In actually proved pancreatitis, it is positive in between 82 per cent. (Pilcher²) and 90 per cent. of cases (Kehr³).

¹ Mitt. aus den Grenzgeb. d. Med. u. Chir., 1909, vol. xix, p. 661.

² Annals of Surgery, 1910, vol. li, p. 89.

³ Münch. med. Wochenschrift, 1909, p. 1062.

2. Chronic pancreatitis is the form most apt to give a negative reaction (Pilcher).

3. The presence of certain sugars, such as grape sugar, pentose, and saccharose, even in very slight amounts, can cause a slight reaction.¹

4. The positive results obtained in scarlet fever, measles, pneumonia, and other diseases (Hagen²) merely prove the pancreas to be affected by the general toxemia of these conditions.

Kehr³ made a novel, but far-fetched, suggestion that in diabetes when the Cammidge reaction is positive, an indication to operate for latent gallstones is furnished. The fact that gallstones may exist without evoking noticeable symptoms, and yet cause a chronic pancreatitis with glycosuria, must be conceded. But to state that a positive Cammidge reaction in diabetics indicates this is to take for granted that the reaction is a specific one for *pancreatitis caused by gallstones* and by nothing else. There is no substantiation for this.

The investigations of Hess have inclined him to ascribe very little diagnostic value to Cammidge's reaction.

Erdmann⁴ says that the Cammidge urine reaction has been proved in the past two or three years to be overwhelmingly satisfactory in making deductions for diagnosis, especially so when the history is well taken and other analyses are well made. This remark applies to those acute, subacute, and chronic cases in which time for analysis of the urine and excreta does not endanger the patient.

Brentano,⁵ before the "Freie Vereinigung der Chirurgen Berlins," presented a *case of necrosis of the pancreas* of this character.

The patient, a strong, well-nourished coal heaver, aged thirty years, addicted to alcohol, had suffered with vomiting and diarrhea since May, 1908. On September 21, 1908, after a very large meal, he had a sudden attack of very severe epigastric pain, accompanied by symptoms of collapse. He was admitted to the hospital on September 25, with Hippocratic facies, slightly icteric conjunctivæ, a pulse of 104, but with no fever. The abdomen was distended and sensitive all over especially in the gastric region, but no masses were felt. The urine contained much albumin and casts, but no sugar. Diagnosis lay between perforation of a gastric ulcer and necrosis of the pancreas.

On the ninth day of illness a slight remittent fever set in, and at the same time an epigastric resistance and tenderness in both flanks was observed. These symptoms continued. Finally, on the twentieth day, a median laparotomy was done. The findings were: No fat necrosis, gall-bladder and stomach negative; behind the transverse

¹ Münch. med. Wochenschrift, 1909, p. 1878.

² Beiträge z. Klin. Chirurgie, Band lxi, p. 750.

³ Mitteil. a. d. Grenzgeb. d. Med. u. Chir., vol. xx, No. 1.

⁴ American Journal of Surgery, 1909, vol. xxiii, p. 189.

⁵ Zentralblatt f. Chirurgie, 1909, p. 540.

colon, and corresponding to the pancreas, a flat projection was found, extending across the right kidney and downward beyond it.

Because union of the affected area with the anterior parietes by suture was mechanically impossible, the abdomen was closed. Aspiration of the right flank, upon yielding chocolate-colored pus, was followed by incision and drainage of a large abscess containing this pus and some shreds of tissue, but there was no demonstrable fat necrosis. Aspiration of the left flank also yielded pus. A large abscess was likewise opened in that situation and drained. Some time later a large piece of necrotic pancreas came away from the opening in the right flank. The patient was discharged February 14, 1909. His general condition still left something to be desired. Brentano called especial attention to the absence of sugar in the urine, and to the absence of fat necrosis at laparotomy or afterward.

Brentano has had six cases of pancreatic necrosis. In one, anterior drainage was established and the patient died. In the other five, posterior drainage was employed, either through the flank, or by the transpleural route. Of these, but one patient died as the result of a long-neglected abscess.

In the matter of *treatment* there is nothing to add to the plan of prompt incision and drainage. The trouble, of course, is to get into the abdomen in time, in the acute cases. If the patient is not carried off by the first shock of the disease, a localized abscess may form, which can be diagnosticated and drained successfully.

THE SPLEEN.

Torsion of the Spleen. Soubbotitch,¹ who has operated twenty-one times for different affections of the spleen, holds that in cases of abnormally movable spleen torsion of its pedicle is common, especially in women. Most persons with a movable spleen have, from time to time, such attacks of torsion which are much favored by the existing anatomical conditions. As a result of such attacks, adhesions form between the spleen and neighboring organs, or possibly, adhesions bind the spleen in places far removed from its normal site. When the initial swelling of the spleen has passed over, it shrinks and becomes indurated, but does not ordinarily alter its shape except in cases of hemorrhage.

¹ Rev. de Chirurgie, 1909, vol. xl, p. 800.

GYNECOLOGY.

By JOHN G. CLARK, M.D.

Cancer of the Uterus. The most authentic statistics are now irrefutable as to cures of cancer, not in isolated instances, but in figures ranging in various organs from 10 to 50 per cent. We have, therefore, made very decided progress, but, measured by our hopes for the future, the results are indeed meagerly pathetic, and show that for every victim rescued thousands pass to death through more enduring and excruciating tortures than those suffered by the most wretched victims of the Bloody Council. We are happily in a transitional period, and the optimist may cheerfully work with the tools now in hand, confidently hoping that out of the seething caldron of research sooner or later the radical cure will come.

The limitations of surgery alone are but too evident, and Wells¹ remarks that after many years of careful and painstaking work, during which the surgical treatment of carcinoma has been developed to a high degree of perfection, surgical intervention in cancer is anything but satisfactory. The best surgical results are about 40 per cent. of recoveries in cancer of the breast, and from 10 to 20 per cent. of non-recurrence after five years in cancer of the cervix. There are but occasional recoveries after pylorotomy for carcinoma of the stomach, and even in carcinoma of the face recurrence follows in about 40 per cent. of the cases. As it is likely that the extent of progress in the direction of operative skill has reached its limit, surgeons feel that the only possible chance of improvement is in early diagnosis. Even in early cases, however, the operation will many times be of no avail on account of the minute particles of carcinoma surrounding the primary growth which cannot be seen.

A specific treatment for carcinoma may be either searched for by purely empirical methods, or by studying the manner in which the body defends itself against cancer. Empiricism has been without results, and the logical way is to find how the body cures itself, and then, if possible, to enhance, supplement, substitute, or even imitate this natural method.

Is there any such natural defence against malignant growths? If it can be established that the human body does have some means of checking the growth of tumors, either to a certain extent or entirely, one may entertain a reasonable hope that malignant neoplasms will

¹ Journal of the American Medical Association, 1909, vol. lii, p. 1731.

not always be incurable. It may be assumed at the start that no malignant neoplasm ever succeeds in growing to the extent to which its innate proliferative ability entitles it. Ehrlich has calculated, from studies of the rate of growth in experimental cancer in mice, that if a single cancer graft proliferated at the usual rate observed in one of his experimental series, and if every descendant graft was implanted into other mice and the process repeated as fast as the tumor reached a size of 1 mm., leaving out of consideration all difficulties in the way of space and nourishment, at the end of one year the total production of tumor tissue would form a mass, which, if cubical, would have an edge one thousand billion kilometers long and would require a ray of light one hundred and five years to travel its length.

One of the commonest changes in malignant growths, especially carcinoma, is necrosis or retrogressive change. These result either from the pressure which the peripheral parts of the growth exert on the more central areas, shutting off the blood supply, or to the growth of the tumor cells away from the blood supply. The rate of growth is decidedly influenced also by the nourishment of the patient as a whole. In the young, well-nourished person, the rate of growth is rapid and recurrences are prompt. In the senile, and in the diseased and feeble, the tumors grow slowly and at times seem to remain stationary. The author cites instances of the natural healing of cancer, manifested as spontaneous local inhibition, or temporary retardation of the growth of recurrence after operation, or of the retrogression of secondary growths after removal of the primary one, or of the disappearance of portions of tumor left at an incomplete palliative operation, or even of the spontaneous healing of a primary tumor without any operative intervention whatever.

Total healing without operative interference of any kind is practically unknown. The author quotes cases reported by Senger, Crosbie, Mohr, Rotter, von Hansemann, Jacobsthal, Martin, Hall, and others, in which there is supposed to have been spontaneous cures of what had been diagnosticated as cancer. He styles all of these cases as more or less questionable, and, as has been pointed out by Gaylord and Clowes, the malignant tumor most apt to undergo spontaneous healing, is chorio-epithelioma.

The evidence concerning the healing of portions of carcinomas left after operation is far better than that offered as proof of the spontaneous healing of growths on which no operation has been done. It has repeatedly happened that surgeons, having found tumors inoperable, have performed palliative operations, and assured the relatives that death would be only a matter of a few months, only to be surprised by having the patient live for years, in many instances dying not from the primary growth, but from remote metastases when the original tumor had been quiescent or even retrogressive for a long time.

In other cases, the microscope has shown that the surgeon's incision in removing a tumor has passed through cancerous tissue, and yet, in spite of this, local recurrence had not taken place. Such happenings are quite frequently reported, but the cases have often been misinterpreted; the diagnosis may have been incorrect, and in the instances in which a local recurrence has not appeared in spite of an incomplete operation, it has been thought that perhaps the remaining cancer cells may have been snared off by a ligature or destroyed by a stitch abscess, or by something of the kind.

As an example of the difficulty of obtaining an accurate diagnosis in certain cases or at certain times during the course of the case, Wells cites the history of a man, aged sixty-three years, who, in 1893, was operated upon for supposedly recurrent appendicitis, and the surgeon found what he said was colloid cancer. The man had a fecal fistula after the operation, and required a second laparotomy for the purpose of closing it, and the surgeon who performed the second operation found what he considered a small calcified mass attached to the bowel. The patient recovered, gained strength and weight, and resumed a very active life for a man of his years as a stock raiser and a farmer. The first diagnosis of cancer was discarded, and held up as a grave error on the part of the surgeon who had made it.

It was not until 1905, twelve years after the first diagnosis had been made, that the patient again began to have abdominal symptoms, and in the course of a year developed intestinal obstruction requiring operation. An extensive colloid cancer, apparently beginning in the region of the cecum, was found. The patient lived but a few days afterward.

Wells does not know whether the original diagnosis was confirmed by the microscope. He believes, however, that the diagnosis was correct, for the operator was a surgeon of considerable experience, and he defended his diagnosis with great positiveness. Apparently following the first operation, the primary growth subsided rapidly, so that a year later, another surgeon noticed nothing but abundant adhesions and a diseased and calcified appendix. Not until some eleven years after a second operation, did the growth redevelop enough to cause symptoms.

Czerny has reported a case somewhat analogous in which a physician, after an incomplete operation for rectal carcinoma, was able to resume his practice for several years, and then died of a profuse recurrence in the peritoneum. In another case, four years after incomplete operation, and in another, five years after incomplete operation, both for intestinal carcinoma, the patients showed no signs of recurrence.

Petersen and Colmers, Gould, Osler and Vulpian, and others, have reported similar cases. Ziemssen, at autopsy, examined the body of a woman who had been operated upon seventeen years before death

for uterine carcinoma; local recurrence had developed after the operation, which was treated by cauterization, and yet no signs of malignant growth were found at the autopsy. Lomer had a patient who showed no evidences of recurrence ten years after an incomplete operation for carcinoma of the uterus. More recently, Weindler reports three cases of recovery for over five years, of patients with inoperable cancer of the uterus treated by local cauterization.

Fleischmann also has observed three cases in which, in spite of apparently very incomplete extirpation of uterine carcinoma, there was no recurrence eleven, ten, and eight years after the operation. On the other hand, so experienced an operator as Martin, who has similarly treated inoperable uterine cancers by local cauterization, has had in his Griefswald clinic but one such patient live as long as twenty-three and one-half months, and one four and one-half years; 70 per cent. died in the first year.

From the evidence in these cases, it would seem that in some rare instances the local forces, whatever they may be, which hold in check a malignant tumor, may succeed in overcoming it entirely, especially in certain cases when part of the tumor is removed. Ehrlich suggests that some peculiar foodstuffs which exist in a limited amount within the body may be necessary for cancer growth, and that when cells with a high avidity for this substance are actively growing, they may consume all that is available and leave none for newly implanted cells. This hypothesis is perhaps rather fanciful, but it might explain the fact, that when a tumor produces abundant and vigorous metastatic growths, the primary growth sometimes stops growing and even atrophies.

Wells wishes particularly to call attention to another set of cases in which the operative removal of the primary growth leads to a disappearance of or healing changes in already present secondary growths.

He reports the case of a woman who remained in fair health for nearly eighteen months after the removal of a carcinoma of the breast, without recurrence in the scar or in the regional glands. The patient died, after a brief illness, with symptoms resembling those of uremic coma and accompanied with polyuria, very probably from cerebral or meningeal metastases, although this could not be determined, as permission to examine the head was not granted. The condition of the secondary growths that were found in the adrenals, mesenteric glands, ileum, and liver, especially the latter, indicated very clearly that, although active proliferation had been going on just before death, there had been an interval in which healing changes had predominated, so that in the liver nearly all the cancer tissue had been replaced by scar tissue, causing cicatricial depressions in the liver such as are commonly found in syphilis.

Apparently, upon removal of the primary tumor, growth had been temporarily checked in the secondary nodules then existing, and heal-

ing processes had made away with almost all of the cancer tissue in the metastases to the liver. It must be that the same conditions obtain in those cases in which deep-seated metastases first make themselves known many years after the removal of a tumor.

Cases of a similar nature, even with complete healing of the metastases, have been described by others. One of the most striking was that of Schuchardt, who, operating for cancer of the stomach, found large numbers of metastases on the peritoneum. The patient died from pleurisy two and one-half years later, and at autopsy nothing remained of the peritoneal metastases, and there was no recurrence in the stomach. Unfortunately, no microscopic examination of the nodules was made, and, therefore, the possibility of a combined gastric carcinoma and peritoneal tuberculosis cannot be excluded.

Such occurrences seem to indicate very clearly that the primary growth exercises an influence on the secondary growths in some way. Very often the sequel of an operation on a primary tumor is a rapid spreading and an increase in size of the metastases, so that the removal of a slowly growing scirrhus cancer may be followed in a few weeks by death from an enormously rapid and abundant development of secondary growths. On the other hand, it occasionally happens, as in the cases cited above, that after the removal of the primary tumor the secondary growths seem to lose their power of proliferation, so that they may either become entirely replaced by fibrous tissue, or they may retrogress for a time and then begin to take on renewed activity of growth.

Just how the removal of the primary growth causes this inhibitory influence on existing metastases is an interesting problem. It may be imagined that the primary tumor supplies some element which either stimulates the secondary growths, or so injures the normal tissues that the secondary growths are not impeded.

A possible explanation of the retrogression of metastases after operation which Wells suggests is *auto-immunization*. During operative manipulation a considerable amount of cancer juice and cancer tissue is forced into the circulation; ordinarily, as we too frequently observe, this results in a rapid and widespread recurrence, but it may happen that under certain circumstances these cancer products stimulate the reactive forces of the organism and lead to an active immunization.

Finally, there is another source of evidence of the resistance of the body to malignant growths. There is prevalent an impression that the escape of cancer cells from the primary growth necessarily means the formation of secondary growths where the cells lodge. This, fortunately, is very far from the truth. It is probable that only an extremely small proportion of the tumor cells which scatter ever succeed in multiplying, for otherwise a malignant tumor would develop metastases almost at its very start. It is by no means uncommon to find a hypernephroma growing into the renal vein as a soft friable tumor thrombus,

from which cells must be continually breaking away, and yet usually there is no metastasis.

A very excellent example of local susceptibility and local resistance to tumor growth is found in the well-known tendency of choroidal melanosarcoma to produce metastases chiefly in the liver. The cells which escape from the primary growth in the eye must first pass through the lungs, and then be distributed all over the body in the systemic blood, of which the liver gets only a relatively small part through the hepatic artery, in addition to that which has passed through another capillary filter in the intestines and entered the portal vein; yet not infrequently in such cases the liver is found riddled or solidly infiltrated with melanosarcoma, while the lungs and the rest of the body are almost entirely free from metastases. Evidently, the many tumor cells which have been lodged in the lungs and the other tissues of the body have been destroyed, while those which lodged in the liver found a fertile soil or a lack of local resistance. Other examples of this sort of local immunity could be cited in great variety.

Schmidt has shown by careful examination of the lungs of patients dying from abdominal cancer, that emboli of cancer cells may be frequently found, exhibiting all stages of disintegration or organization (in 15 out of 41 cases). Lubarsch suggests that cancer cells must first be rapidly set free and destroyed in the regional lymph glands until the poisonous materials thus liberated have so overcome the cells of the glands that they can no longer successfully resist the cancer cells. At any rate, it appears that the tissues or the body fluids are able to defend the body to a very considerable extent against the cells of malignant tumors. The manner of this defence is not understood.

This interesting and instructive paper of Wells probably sounds the keynote of the sort of knowledge which will some day revolutionize the treatment of cancer. But how difficult the problem is! According to Tyzzer,¹ the experimental investigation of tumors, although recent, has already yielded valuable results. There is no more basis for pessimism regarding the solution of the tumor problem than there was formerly for a similar attitude with respect to the infectious diseases.

The principles of growth are of broad biological significance, and they should not be considered solely from the medical point of view. Up to the present time, no more is known of the forces regulating normal growth than is known of the forces concerned in the abnormal growth of tumor tissue. It is possible that the question concerns the biologist, the zoologist, and the embryologist, as well as the physician. It is proved by transplantation experiments that cancer cells differ biologically by their property of unlimited growth from normal tissue cells. Peculiar conditions are essential for the continuation of this

¹ Boston Medical and Surgical Journal, July 22, 1909, p. 103.

growth. Certain tumors grow in normal individuals. Their tumors, however, require special soil; they grow if transplanted into other parts of the same individual, but not if transplanted to other individuals. Growth is found to depend upon the biological character of the cells and not upon their location.

The development of sarcoma in animals inoculated with epithelial tumors has appeared to be the result of the irritating influence of the tumor epithelium. The demonstration of the presence of substances which prepare tissue for growth upon subsequent injury or stimulation is of great importance.

Whether cancer is or is not a parasitic disease can be neither affirmed nor absolutely denied, but such a well-known investigator as Loeb¹ believes that the increase in our knowledge during recent years has not tended to prove the parasitic hypothesis.

Among the best established factors, he says, in the pathogenesis of cancer are various non-specific physical or chemical stimuli. Ordinarily, somatic cells without any predisposing embryonal maldevelopment, or any postfetal misplacement, can, in certain cases, become transformed into cancer cells under the influence of long continued irritation.

Although the work of Walker, Beebe, Crile, Gaylord, Clowes, and Sticker, as well as Ehrlich, Bashford, and Schoene, has been successful in preventing the growth or in causing regression of experimental tumors by the inoculation experiments, at the present time their results do not admit of any application to man, for the following reasons: These immunizing inoculations have so far been effective only if they were made before the tumor had been transplanted; they were without avail in cases in which the tumor growth had already commenced at the time of the immunization. Furthermore, all these experiments relate almost exclusively to transplanted, not to spontaneous tumors, with which alone we have to deal in man. It is quite certain that marked differences exist between the growth of transplanted and of primary tumors, the latter being in all probability much less accessible to the action of therapeutic agencies than the former.

It seems likely to Loeb that, if immunization should be attempted in man, it might be best to use the sterile, extirpated tumor of the patient for vaccination, after having decreased its virulence sufficiently through a moderate heating or through similar physical means.

THE METASTASES OF UTERINE CANCER. Offergeld, whose work on the metastasis of uterine cancer to the brain and spinal cord we reviewed last year, has been active in determining the frequency of metastasis to the different organs of the body. This has been done in a series of papers. Concerning the metastasis of carcinoma of the uterus to

¹ Pennsylvania Medical Journal, November, 1909, p. 87.

the *hematopoietic system*, Offergeld¹ concludes that metastasis to the *spleen* is a very infrequent occurrence and takes place only from very widely advanced carcinomata of the lower part of the uterus. The metastasis is hematogenous and is usually associated with hematogenous metastasis to other organs rarely involved, for example, the adrenals, the brain, the skin, and the mammary glands. On account of their small size and their central position, metastases to the spleen usually give rise to no clinical symptoms and are discovered only at autopsy. To determine their true frequency, the spleen should be examined histologically at every autopsy for carcinoma of the uterus.

In regard to *metastasis to the bones*, one must distinguish between an actual metastasis and a carcinomatous process involving them by extension from the regional lymph glands or directly from the primary tumor. Metastasis of tumor cells is more apt to take place from the cervix in inoperable or widely advanced cases. Every bone has points of predilection, occasioned by the form of blood supply and its static peculiarities. The real bony metastases occur only by way of the blood channels and arterial emboli, extremely seldom by means of retrograde venous transportation.

There is no tendency for carcinomatous metastases in bones to undergo osteoplastic formations. The periosteum and the dura mater are more resistant than the bones. The *clinical symptoms* of metastatic carcinoma of bones are those of tumor and spontaneous fracture; nervous symptoms also may occur from the irritation of the nerves in the immediate neighborhood. The clinical symptoms are usually interpreted incorrectly, and the condition is only discovered at autopsy. The bony system should be examined in every autopsy in which uterine cancer is present.

For the occurrence of metastases to the hematopoietic system, a predilection of the individual is necessary. A predisposition is occasioned by the original tumor, some intercurrent disease, or by accidental causes. Cachexia is the total general effect of the tumor, and is caused by hemorrhage, suppuration, septic infection, and fermenting toxic products. Metastasis to the hematopoietic system is infrequent because of the physiological activity of the organs, the formation and the destruction of blood cells, and the freeing of nuclein which provokes pyrexia and the formation of leukocytes. The same author² found *peritoneal metastases* usually with advanced stages of uterine cancer; occasionally, they occur earlier. The favorite points of metastasis are Douglas' pouch and the vault of the diaphragm. Whether the peritoneal cancer is actually metastatic or indicates primary multiplicity of cancerous disease, it is impossible to say. Secondary nodules in the omentum

¹ Zeit. f. Geburts. u. Gyn., 1908, Band lxxiii, S. 217.

² Archiv f. Gyn., 1909, Band lxxxvii, Heft 2, S. 298.

and the muscular wall of the intestine are of lymphatic origin. The most common symptoms are those of an intra-abdominal tumor, chronic peritonitis, and stenosis of the bowel. Usually, however, they develop without symptoms.

Metastasis to the liver takes place in from 5 to 15 per cent. of the cases. It may appear in any stage of the disease, either in the beginning or in inoperable cases. Liver metastases may be hematogenous or lymphogenous. If hematogenous, metastasis occurs either by way of the hepatic artery after passing through the pulmonary circulation, which is very unusual, or through the portal vein after the carcinoma has broken into its upper part, or into the inferior hemorrhoidal vein, or into the veins which form the communication between the inferior vena cava and the portal above the suprarenal vein. If metastasis is lymphogenous, it occurs through the lymph radicals which are found in the neighborhood of the tributaries of the portal veins in the small pelvis, through retrograde transportation, or through the mesenteric lymph glands and the portal vein. Metastases to the liver are favored by the fact that the liver possesses two capillary systems, one in connection with the hepatic artery, the other in connection with the portal vein. The liver is unfavorable on account of its biological fermentative activity, by which particles of tumor cells lodging therein are destroyed.

Metastatic carcinoma of the *pancreas* is very infrequent. It usually appears in widely advanced cases, and affects the head of the organ. It occurs through retrograde transportation from the retroperitoneal lymph glands. It is usually symptomless, but may exhibit the general symptoms of a tumor. During life it is only seldom correctly diagnosed as a metastasis. In one case, it was distinguished by the obstructive jaundice, and, in another case, by the positive findings with Sahli's test.

In studying the metastasis of uterine carcinoma to organs with an internal secretion, Offergeld¹ discovered that *metastatic carcinoma of the thyroid gland* was very unusual. It occurs only in inoperable cases of uterine cancer and in general carcinomatosis. The secondary growth is hematogenous, and causes symptoms of compression and displacement. The thyroid gland should be studied in every autopsy upon a case of carcinoma of the uterus.

Metastasis to the adrenals is rare. It is hematogenous, and favors the left side. Metastases occur occasionally with operable primary growths of the uterus, but in combination with a general spread of the cancerous process—galloping carcinoma. In the latter cases, the primary cancer is apparently operable, but a postmortem would show the cancer very generally distributed and treatment would be unavailing. Adrenal carcinomas gave rise to no symptoms.

¹ Archiv f. Gyn., 1909, Band lxxxvii, Heft 1.

Kidney metastases are more frequent but occur only in advanced cases of cancer of the uterus and in combination with general and multiple metastases. The metastasis is hematogenous, and has no distinctive symptoms.

Before metastasis to an organ with an internal secretion can take place, the formation of alexins must be diminished. Whether the iodine in the thyroid has any influence is uncertain; adrenalin is possibly active in this way, and, in the kidney, nephrolysin may cause a degeneration of the cancer cells.

Metastatic carcinoma of the pleura from primary cancer of the uterus is quite infrequent.¹ It occurs only in very advanced cases, and mostly in cancer of the cervix. It occurs usually by means of the lymphatics through a retrograde transportation from the pulmonary and the peribronchial glands. It has certain points of preference, but is not manifested by particular symptoms. *Metastases to the lungs* are relatively frequent, occurring in from 5 to 7 per cent. They occur sometimes quite early. They are usually bilateral and affect with preference the central part or the borders of the lower lobes. They take place through the blood, although occasionally by way of the lymph channels. *Carcinomatous lymphangitis of the lung* is a very rare complication of uterine carcinoma.

Offergeld² declares that *metastases to the skin* and the *mammary glands* are very unusual. They occur mostly in advanced cases. The usual site of cutaneous metastasis is the region of the navel and the mammary glands. The skin metastases are usually hematogenous, occasionally of lymphatic origin. They do not occur from implantation. The skin metastases, as a rule, occasion no symptoms.

SECONDARY CARCINOMA OF THE UTERUS. Offergeld³ reports 22 cases of *secondary cancer of the uterus*. The primary tumors were located in the intestinal tract, especially in the stomach and rectum, and in the breast. The metastasis occurred only when the process had involved neighboring organs, and affected particularly the myometrium and the mucosa. The metastasis to the myometrium, in at least 77 per cent. of the cases, had occurred by way of the lymphatics. Secondary carcinomata of the endometrium were most frequently of hematogenous origin. The secondary carcinomata usually agreed, histologically, with the primary tumor. He did not include the carcinomatous nodules found in the serous coat of the uterus when there was general involvement of the peritoneum. Three of the cases occurred in pregnant uteri. Secondary carcinoma grows very rapidly in the pregnant uterus, but in the non-pregnant it grows very slowly.

¹ Archiv f. Gyn., 1909, Band, lxxxvii, Heft 2, S. 286.

² Monats. f. Geburts. u. Gyn., 1909, Band xxix, S. 870.

³ Zentral. f. Geburts. u. Gyn., 1909, Band lxiv, Heft 1, S. 1.

THE PREVALENCE OF CANCER. Dixon¹ says, the available statistics show conclusively that the mortality from cancer is increasing throughout the civilized world. In the registrative area, which comprises about 50 per cent. of the entire population of the United States, there were 30,514 deaths from cancer of all forms in 1907. The death rate per 100,000 of population increased from 47.9 in 1890 to 73.1 in 1907.

The distribution between urban and rural localities shows no marked variations. The deaths from cancer, according to an International Classification, records the tumor as occurring in the following localities with the accompanying percentages: Mouth, 3.2; stomach and liver, 38; intestines and peritoneum, 11.7; female genitalia, 14.3; breast, 8.5; skin, 3.7; other organs, 20.6.

The mammary and generative organs are affected in about 40 per cent. of the cases among females; 96 per cent. of all deaths from cancer occur in persons over thirty-five years of age. Westbrook² says that in New Jersey, in 1900, the deaths from cancer were more than those from tuberculosis. In New York, in 1907, there were 7000 deaths from cancer, and 13,000 from tuberculosis. In the whole country today, there are approximately 80,000 cases of cancer. One woman in eight, who reaches her thirty-fifth year, dies with cancer. The author draws attention to the fact that carcinoma is much less frequent in the duodenum than in other parts of the intestinal tract, and points out that this part contains fewer germs than any other area of the small intestine. Loeb³ points out, as the only preventive measure, the avoidance of long-continued irritation of any kind.

EARLY DIAGNOSIS OF CANCER. According to Loeb,⁴ who has reviewed the practical results of cancer research, the principal weapon at the present time in the struggle against cancer consists in the thorough extirpation of the disease, for in the beginning cancer is a local disease.

After all, Scheib⁵ says, the thing of greatest importance is the early diagnosis of carcinoma. So long as the operative treatment of carcinoma offers the best chance of cure, so long will it be necessary to discover the growth at as early a period as possible.

Kline⁶ announces that 15,000 women die yearly in Germany from cancer of the uterus, and this in spite of the fact that the absolute percentage of cures has increased in certain hands up to 20 per cent. It is necessary to repeatedly and continuously instruct the laity, especially those of the lower classes.

Watkins⁷ points out the necessity of regarding every uterine hemor-

¹ Pennsylvania Medical Journal, November, 1909, p. 96.

² American Journal of Surgery, September, 1909, p. 285.

³ Loeb, loc. cit.

⁴ Ibid.

⁵ Archiv f. Gyn., 1909, Band lxxxvii, Heft 1 and 2.

⁶ Zentral. f. Gyn., No. 42, p. 1451.

⁷ American Journal of Surgery, April, 1909, p. 128.

rhage with alarm in women over thirty-five. There is in no other condition more urgent indications to determine the truth or falsity of the suspicion, in such a case, that the patient has a malignant growth.

Moulton¹ says that the present hope of securing earlier recognition of carcinoma of the uterus must lie in the hands of the general practitioner; he must start a campaign of education among the women of his clientele. All women approaching the cancer age have, as a rule, some physician to whom they look for advice and who occupies to them the position of "father confessor" in all medical affairs. If the family doctor will impress upon these women the necessity, as they approach the menopause, of reporting to him any changes in the character of their vaginal discharge; if he will then go to the point of impressing upon his patients the value of a routine vaginal examination at least once in every six months in women between the ages of twenty-five and fifty-five, whether they have any symptoms or not, the statistics of operable cancer of the cervix will take their place along with those of cancer of the breast. Cancer of the cervix does not differ in its biology from cancer on the visible surfaces of the body, and, could it be seen in the same stage of its development, it would be just as amenable to surgical cure. After noting the necessity for physicians to be constantly on the alert for carcinoma, Clark² takes up the question of educating the laity concerning cancer of the uterus. Publicity will work in two ways: (1) By instructing women as to the significance of untoward menstrual symptoms, particularly at the climacteric epoch; and (2) the indolent in our profession will be so shocked by the roor-back from this propaganda that he will give closer heed to symptoms which the layman has learned to regard with suspicion.

This has been noted already in Germany, where the instruction of the public has been instituted through popular articles in lay periodicals. Impressed by the overwhelming number of patients with inoperable carcinomata seeking care at the German clinics, Winter, in 1891, instituted an investigation to determine the cause and whether it was remediable. He found, upon careful inquiry, that 33 per cent. had been treated for considerable periods of time without examination, the physicians simply relying upon a very cursory history for his guide in treatment.

As a result of this appalling observation, a vigorous campaign against such haphazard and criminal methods was instituted, which quickly wrought a gratifying improvement. Four years later, in the same locality in Eastern Prussia, he reviewed 100 clinic cases, with the following results: 87 patients had been examined at once; 9 had been referred to a clinic for examination; and 10 only had been treated with-

¹ Journal of the American Medical Association, 1909, vol. lii, p. 851.

² Pennsylvania Medical Journal, November, 1909, p. 113.

out an examination. Thus, there had been a decrease of from 33 per cent. to 10 per cent. in four years. A quick response to a worthy impulse.

Sampson, after investigating 412 cases of cancer admitted to the Johns Hopkins Hospital, found that in 93 per cent. of the patients bleeding occurred in some form or other. It varied from a slight "show" to profuse hemorrhage. He clearly emphasizes, by his investigation, that a very short period of neglected bleeding determines the horrible fate of the patient. In this disease, days are vital to the patient's welfare. Patients rarely live over three years. Three-fourths succumb within two years, and one-third within one year after the very first manifestations. Only 30 per cent. of the cases in this country are operable when diagnosed, and only 13 to 25 per cent. of such cases are cured by operation for a period of at least five years.

Clark¹ further remarks that while with our profession it is a well-established axiom that early operation is the only cure for cancer, to the layman this remedy is the one most abhorred. The terror inspired by the knife is so well known that every vampire seeks to offset this horror by advertising, in the most seductive way, a sure cure without surgical means. Through the courtesy of Dr. Green, the assistant secretary of the American Medical Association, I have received scores of clippings of such advertisements from the most reputable journals and newspapers in the United States, and in some instances these advertisements have been further bolstered up by commendatory editorials. Prominent headlines are devoted to the statement that cancer is not cured by the knife—a statement which appears glaringly patent to every layman when he recalls the number of individuals, probably within his knowledge, who have not been relieved by an operation, or have succumbed immediately from its effects. In surgical cases, the layman always hears of the mishaps and fatalities, while the good results may be overlooked.

In patients who have been relieved of cancer by operation, the knowledge of the exact nature of the disease is usually withheld from them. In the one fatally stricken by this malady, the hallmarks are too clear to be disguised. There is, therefore, a well-founded opinion among laymen that cancer is incurable by surgical means. To paraphrase Mark Antony's funeral oration, "The evils of operation live after them, but the good is interred with their bodies." The quack adroitly turns these facts to his advantage, and plays upon this false interpretation to his own evil gain.

In the booklet of a notorious institute, which has a wide circulation, under the title of "The Use of the Knife," the following opening sentence is noted: "The great majority of either cancers or tumors are

¹ Loc. cit.

of such a nature that the use of the knife simply retards their destructive work, driving them more deeply into the system and allowing them, in time, to return with renewed and increased vigor." How artfully such a statement covers the ill results of surgery! How skilfully it appeals, even to an intelligent person, who has had some friend or member of his family unsuccessfully operated upon! As he has witnessed the course subsequent to operation, there has been no apparent or at most only temporary relief. When the metastatic deposit in the liver or other organs becomes evident, with its loathsome train of wretchedness and misery, it is not unreasonable that both the family and friends should become bitter pessimists. After painting the picture of this disease in a pseudoscientific manner, which so appeals to the vanity and credulity of many laymen, the charlatan offers his simple, painless, and positive cure.

In another booklet before me, which is carried by our postal system to thousands of homes, the seductive invitation to certain death is worded as follows: "Our specialists through years of experience in the treatment of cancerous and other growths have established the fact that cancer is a curable disease, and that our remedy is so sure and safe that we are able to give a written guarantee of permanent cure, a thing no other specialist can do."

HOW SHALL WE EDUCATE THE PUBLIC? Hedged about by our ethics, medical knowledge has been in the past too much the property of a closed corporation. This is manifestly wrong, for how can we hope for the coöperation of the lay world unless we furnish them with an intelligent conception of our aims? Happily, the turning point is behind us, for not only have many of the most important periodicals taken up educational campaigns in matters of public and personal health, but the American Medical Association has assumed this function, and has constituted a Board of Public Instruction for the dissemination of all facts which may be utilized by the world at large.

In an educational campaign with regard to cancer, we must necessarily steer a very guarded course, for to generate in the mind of the neurotic the fear of this disease when it is not present could only result in evil consequences. The word cancer carries with it such terror, and so completely crushes hope, that the enlightenment of women must be carefully attempted, and they must be assured that not every lump in the breast is cancer, nor every atypical menstrual flow an indication of malignant changes in the uterus, but that such deviations must at once have attention in order to prevent a more serious condition.

It is a well-known fact that the tuberculous subject is always hopeful, while, upon the contrary, the cancerous patient is cast into the very slough of despond by the suggestion of his disease. Instruction, therefore, must be given with a view to merely enlightening the public concerning suspicious symptoms, in order to secure their earlier attention.

Happily, in a majority of women with these symptoms, even in the cancerous age, no trace or suspicion of the disease will be found upon examination, and only some trivial lesion will be the cause of the atypical bleeding. While, therefore, the statement may be adhered to that the alarmist's viewpoint is, in general, to be decried, in cases of cancer of the uterus there is little danger from this attitude, for if a fear of the disease has been aroused by suspicious signs, it may quickly be set aside or confirmed by an examination.

In this disease there is not that long, anxious waiting for symptoms to unfold themselves in order to confirm the diagnosis. Soul-racking apprehension of impending evils can, therefore, be at once established or set at rest. If the diagnosis is positive, a precipitate operation should be urged; if, on the other hand, there is no cancer, the patient is all the happier and all the safer for this knowledge. Under these conditions, she will not become morbidly introspective, as is so usual with the person harboring the secret fear of this disease. Now that the ignorant as well as the intelligent women are coming to learn that operation is the only hope held out for their cure, the very fact that a negative diagnosis is followed by the assurance that no operation, or at most only a trivial one, is required, at once allays all fears.

Lectures before women's clubs, and particularly the judicious talks of physicians to patients, are likely to be most effective. We must certainly, in the end, appeal, through popular channels of publication, to the lay world; but, as in other medical subjects, such instruction must be supervised carefully to prevent the arrow going wide of its mark.

Cullen¹ designates three different situations in which cancer may develop: From the squamous epithelium which covers the vaginal cervix, from the glands or epithelium of the cervical canal, and from the glands or epithelium of the endometrium.

He says that any bloody or watery vaginal discharge that cannot be definitely accounted for, demands immediate and careful local examination. If the cervix is found to be rough, friable, and bleeding, the diagnosis of cancer is usually certain. If the diagnosis is uncertain, a wedge of the suspected area, about 1 cm. deep and 2 or 3 mm. broad, should be excised and sent to a suitable pathologist for an examination. If the cervix appears normal, the question then arises as to whether the cervical canal or the cavity of the uterus is affected. In such cases, unless other diseases are found which clearly explain the symptoms, the uterus must be most thoroughly curetted. The tissues should be thrown into a 10 per cent. formalin solution and sent to a pathologist.

As a rule, there is just as much difference under the microscope between cancerous and healthy mucosa as there is between two totally different patterns of wall paper.

¹ Pennsylvania Medical Journal, November, 1909, p. 110.

From no other part of the body is it possible to so easily obtain material for diagnosis. Take, for instance, cancer of the stomach; how thankful the operator would be were it possible to just introduce a straight curette to the pylorus and bring away some tissue for diagnosis, without the necessity of making any incision or of doing any suturing! For the early diagnosis of cancer of the stomach an exploratory operation is usually necessary. We, as general practitioners and surgeons, have absolutely *no excuse for failing to diagnosticate cancer of the uterus within one week* after the first time the patient comes under our observation.

OPERABILITY. The increase in the percentage of cases which are limited enough to warrant a radical operation is due to earlier diagnosis and a more skilful development of operative technique. It is sometimes difficult to tell whether a given case is suitable for total extirpation.

The principle of von Franke and Kleinhans, as noted by Scheib,¹ is to operate radically on all cases in which there is no clinical evidence of widespread involvement of the neighboring parts or of the lymphatic apparatus, such as broad carcinomatous infiltration of the parametrium as far as the wall of the pelvis, widespread involvement of the bladder or of the rectum, or secondary carcinoma of the external inguinal lymph glands, or metastases to distant organs. Cases which were considered operable were many times found to be inoperable during the course of the operation, and where it was possible under such circumstances, a palliative procedure was carried out, such as simple supravaginal amputation of the uterus or ligation of both uterine arteries.

From April 1, 1903, to September, 1907, there were 10,306 patients at their clinic. Among them, 604 suffered from cancer of the uterus, 73 of which refused treatment; 531 cancers of the uterus were taken into the hospital; 307 cases were considered inoperable, and were treated by curettement with subsequent cauterization; 224 were exposed to operation; 52, by vaginal operation; 172, by the advanced abdominal method. The operability for carcinoma of the cervix varied between 20.5 per cent. in the first year, to 40.8 per cent. in the last year for the advanced abdominal operation.

In Reinecke's² cases the average operability for the entire period of years (1898 to 1903) was 40.76 per cent., and, in the last year, it reached 50 per cent.

The *value of cystoscopy* as an aid in determining the involvement of the vesical wall was investigated by Scheib, who found that whenever there was a tumor-like irregularity of the bladder wall or a formation of nodes or processes, a secondary carcinomatous involvement was to be expected, and if there was bullous edema and slight displacement of the ureter, an involvement of the bladder could not be excluded.

¹ Loc. cit.

² Zeit. f. Geburts. u. Gyn., Band lxx, Heft 1, S. 129.

LOCAL DISINFECTION OF CARCINOMA OF THE CERVIX PREPARATORY TO OPERATION. Barth¹ has made bacteriological examinations of the operative field in 55 cases of carcinoma of the uterus. He examined the carcinomatous ulcer itself, the parametrium before the vagina was opened during the course of the operation, and the pelvic peritoneum covering the operative area at the close of the operation.

In not one of the 55 cases examined was the carcinomatous ulcer free from germs. In 27, he obtained diplococci, bacilli, staphylococcus aureus and albus; in 4, he found a non-hemolytic streptococcus; in 24, he found a hemolytic streptococcus, nine times in pure culture. About a half, therefore, of the carcinomata were infected by a hemolytic streptococcus.

The penetration of the streptococcus to the parametrial tissues is very infrequent. He found it but once when the test was made before the vagina was opened, and that was a case in which the carcinomatous ulcer had given a pure culture of the same organism. This patient had a fully normal convalescence, except that a vesicovaginal fistula developed.

Thrombi from the uterine vein and from the vesical veins in 6 cases were always sterile, and the bacteriological examination of a distended suppurative gland showed only a feeble staphylococcus albus, while in the cancer itself hemolytic streptococci were present.

Much more important than a negative finding in relation to the freshly opened parametrium is a bacteriological examination of this connective tissue, and the peritoneum of the pelvic floor at the end of the operation. In 16 cases, he found microorganisms upon the peritoneum used to cover in the operative area. Four times diplococci and bacilli, once a hemolytic colon bacillus, four times staphylococcus albus, twice non-hemolytic streptococci, and five times hemolytic streptococci. There was no complication directly attributable to any of these organisms, except in 4 of the 5 cases which showed hemolytic streptococci. One of these hemolytic streptococci cases got well; 3 of the others died, and 1 had a narrow escape.

The author believes that every carcinoma of the uterus should be examined culturally before operation, and in all operations on carcinoma the most painstaking preparation should be employed to limit infection so far as possible. Cultures taken during the operation will be useful in estimating the prognosis of the particular case.

Strassman² allows three weeks for the preparatory treatment of the carcinomatous cervix, and Brose³ emphasizes the fact that the carcinomatous mass must be sufficiently disinfected, no matter how long it requires. Their views are not shared entirely by Seeligmann,⁴ who,

¹ Archiv. f. Gyn., 1909, Band lxxxvii, Heft 2, S. 350.

² Zentral. f. Gyn. No. 17, 1909, p. 595.

³ Ibid., p. 593.

⁴ Ibid., No. 32, 1909, p. 1115.

although he thinks it a good plan to have the carcinomatous area as thoroughly disinfected as possible, so the angular clamps are not necessary in doing the radical abdominal operation, is nevertheless skeptical as to the advisability of allowing the preparation of the cancerous area to occupy as much time as three weeks.

He wonders if granulating surfaces can be freer from infection than a freshly curetted surface which is suitably treated for a few days. He also asks whether, if one waits for three weeks, a carcinoma may not make considerable advancement. He would not keep a patient waiting that long, unless it appeared absolutely necessary. His own procedure is as follows: Under ether he thoroughly cures the carcinoma, and then tampons with a 3 per cent. solution of perhydrol. It is important that the patient does not lose too much blood, and the tampons should be placed quickly. The next day the tampon is renewed. Operation is done on the third day.

Previous to the operation, the carcinomatous crater is washed energetically with absolute alcohol for five minutes, and afterward with warm sublimate solution. The crater and vagina are dried, and filled with sterile iodoform gauze. A small clamp is inserted to the highest point inside the tampon to act as a guide in opening the vagina from above. It serves the purpose also, after the vagina has been opened, of drawing down through the vagina, any gauze drainage that may be desirable. He has followed this plan upon his last 13 cases with good results. Not one died from the operation. One patient died on the seventh day from embolism, but there was no sign of peritonitis.

Mackenrodt¹ no longer treats the carcinomatous ulcer with formalin previous to operation, because the action of the latter is often too deep, and necrosis is frequent. In its place he uses the tincture of iodine. After thoroughly curetting the carcinoma, the crater is first tamponed with gauze saturated with sublimate solution. The evening before the operation the sublimate tampon is replaced by one of tincture of iodine. This tampon is renewed on the morning of, and just before, the operation.

Scheib² says that the cases of von Franque and Kleinhans are given a 0.5 per cent. formalin douche daily. On the evening before the operation, cervical carcinomas are carefully curetted without an anesthetic, sometimes after hypodermic injection of morphine; the cancerous crater is cauterized, and packed with a strip of gauze soaked in 5 per cent. formalin. When possible, just before operation, the cervical lips are closed over the cancerous crater by means of sutures.

In regard to the preparation of the cancerous mass for operation, Zweifel³ warns that curettement or cauterization will frequently lead to febrile disturbances, parametritis, and peritonitis, and may make

¹ Zentral. f. Gyn., 1909, No. 17, p. 593.

² Loc. cit.

³ Zentral. f. Gyn., 1909, No. 32, p. 1105.

a radical operation impossible. For this reason, he believes it is better to do everything at one sitting—both to disinfect the local seat of cancer, and perform the radical operation. He is skeptical, however, as to the possibility of disinfecting a suppurating cervical or portio cancer with superficial cauterization and washing.

Loeb¹ advises careful guarding of the cancer area for another reason. He says that certain experiences in tumor inoculation prove that the liability to the formation of local metastases may differ, even in tumors of the same histological structure. Any contact between the tumor and the surrounding tissues, therefore, should be very carefully avoided during operation. Inasmuch as mechanical injury to a tumor may, in certain cases, lead to an increased energy of growth, it seems that, whenever possible, an exploratory incision ought to be followed at once by the radical removal of the tumor.

Schauta² encloses the cancerous crater by circumcising the vaginal fornix and sewing it over the portio.

REMOVAL OF PELVIC GLANDS. The views as to the necessity of removing the pelvic lymph glands, in order to carry out a truly radical operation, have undergone a change. Thus, Mackenrodt, one of the most enthusiastic believers of glandular extirpation, recently has expressed himself as feeling that the question of the glands is only of importance in young women. After the menopause, and in the infiltrating forms of carcinoma, the lymph glands are occluded or atrophic. In all other cases, however, the glands must be palpated and usually cleaned out. Kroemer³ holds that the glands, and as much of the pelvic connective tissue as possible, should be removed, even in patients beyond the age of fifty, and Jonnesco,⁴ after remarking that the microscopic appearance of the pelvic lymph glands is no criterion of whether they are carcinomatous, recommends dissection of the entire pelvic cellular tissue, with the lumbar and the iliac glands. The more extensive the cancer is, he says, the more extensive must be the dissection, for it is only in this way that a permanent cure may be expected.

Scheib is rather inclined to be skeptical about curing cases in which there are cancerous glands, but says that Wertheim had three, among his permanently cured cases, from which he had removed cancerous glands, and Mackenrodt eight. It can easily be seen that the number of such cases is relatively small, in comparison with the great number of women who have been operated on. Nevertheless, it is undoubted that the importance of glandular removal is overshadowed by the necessity for extirpation of as much connective tissue as possible. An editorial⁵ says that "if one stops to consider the actual rate at which lymph must travel in the finer lymphatics, it becomes at once evident

¹ Loc. cit.

² Zentral. f. Gyn., 1909, No. 40, p. 1392.

³ Ibid., No. 17, p. 594.

⁴ Ibid., No. 19, p. 675.

⁵ Journal of the American Medical Association, vol. lii, p. 1428.

that the velocity must be far too low to permit it to have much effect in washing cancer cells or similar objects from one place to another. Furthermore, the very fact that the lymphatics are extensively blocked by cancer growth, must make the rate of lymph flow rather less than normal. Nevertheless, the assumption and the teaching, until quite recently, have been almost universal that cancer cells were washed from the primary growth to the regional glands by the lymph stream." This idea has been overthrown by Handley, who has demonstrated continuity of cancer growth from the primary tumor into the regional lymphatic channels, spreading centrifugally by direct extension and largely independent of any washing away of cells. The demonstration is of great service to surgical practice, for it demonstrates once and for all the necessity of removing as much as possible of the tissue lying between the primary tumor and its lymphatic metastases.

TECHNIQUE OF OPERATION. Mackenrodt still regards the horseshoe-shaped incision as the best way of exposing the deepest part of the pelvis. He says it does not require drainage. Few operators share his fancy in this respect—von Franque and Kleinhans employing it but three times, and Bumm,¹ except in very fat persons, says he obtains just as good exposure by a longitudinal incision and the use of suitable retractors. Most authors have adopted Wertheim's technique as modified by Bumm. In von Franque and Kleinhans' cases, the adnexa, parametrium, the upper third or more of the vagina, all visible and palpable regional glands (iliac, hypogastric, obturator, perisacral and internal inguinal) were removed as far as possible in connection with the uterus. The search for the glands and their removal with the surrounding fatty tissue was done in part before the hysterectomy; the glands lying deep and harder to reach, were taken out afterward. In exposing the ureters, care was taken not to touch them with instruments, and, when possible, to uncover them only where they were in relation to the parametrium. The separation of the bladder from the vagina and cervix was usually done by means of blunt dissection. If this was not entirely satisfactory, the scissors and the knife were used.

The separation of the vagina posteriorly was accomplished by blunt dissection after cutting through the peritoneum of Douglas' pouch, and ligation of the uterosacral ligaments. Wertheim's clamps were used in cutting through the vagina. Before cutting through the vagina, the greatest care was taken to protect the surrounding tissues with gauze compresses, and after opening the anterior vaginal vault a strip of iodoform gauze was placed in the vagina, the other strip being removed from below.

The retroperitoneal connective tissue was drained for the first twenty-

¹ Zentral. f. Gyn., 1909, No. 17, p. 595.

four hours by a small strip of gauze which was passed through the vagina and placed in relation with the ureters as little as possible. Where infection of this tissue can apparently be excluded, the gauze drain is no longer used.

Strassman¹ always uses drainage after the abdominal operation. Angular clamps are superfluous. After the ureters have been dissected free, the vessels can be tied on each side with one ligature. The uterine artery dare not be tied at its point of origin, because in this way the superior vesical artery may be deprived of blood and gangrene may ensue.

Cullen² draws attention to the value of *Krönig's light* in performing abdominal hysterectomy for cancer; he says the operator can save often from fifteen to thirty minutes, and, by means of Krönig's electrical operating table, the patient can be kept at an equable temperature, and usually leaves the operating room in an infinitely better condition than when the ordinary table is used.

Zweifel,³ in an analysis of operations, found that of forty-seven deaths, nineteen were from peritonitis. The second most frequent cause of death was ascending pyelitis. In order to guard against peritonitis, which he regards as by far the most frequent cause of death, he has developed a plan of operation very similar to that proposed by Werder in this country a number of years ago. In the twenty-four operations which he performed by the new method there was only one death, and that was on account of tying the right ureter. Wertheim⁴ declares that he described the same method as Zweifel in the year 1900, but that he gave it up after using it a while because he believed clamping of the vagina beneath the carcinoma before detaching the vaginal fornix was a much better plan of procedure.

Before making the abdominal incision, the carcinomatous cervix is prepared by thorough curettement with a sharp spoon and by the use of the cautery, and tampons soaked in sublimate solution are placed against the carcinomatous cavity. The tampons are removed just before the vaginal tube is clamped from above. After clamping the vagina from above it is washed out from below, so that any particles of cancer tissue which have been loosened may be removed. In the last 158 cases, Wertheim's mortality has been only 7.5 per cent.

CHOOSING THE TYPE OF OPERATION. There is a very general opinion that the abdominal operation is preferable to the vaginal, whether the glands are to be removed or not, and Wertheim⁵ insists that extirpation of the glands is less important than resection of the parametrium, and that the best exposure of this tissue can be obtained by the abdominal route.

While this statement is everywhere accepted with regard to the

¹ Loc. cit.

² Loc. cit.

³ Zent. f. Gyn., 1909, No. 32, p. 1105.

⁴ Ibid., No. 38, p. 1329.

⁵ Loc. cit.

simple vaginal operation, there are sturdy adherents to the vaginal operation elaborated by Schauta and Staude. In this, a paravaginal incision is used, and Schauta¹ declares that the vagina, the rectum, and the bladder are more accessible than by the abdominal method.

Mackenrodt² believes that the Schauta-Schuchardt paravaginal operation is more complicated and more dangerous than the abdominal operations, and its results are not as good. Jayle,³ who has had twenty-eight hysterectomies for carcinoma, says that while Schuchardt's vaginal hysterectomy has considerable advantage over simple vaginal hysterectomy, he has abandoned it, because of a very severe disturbance from the extensive cicatrix which followed in one case. He thinks the abdominal operation is much less dangerous.

No doubt both forms of operation have their advantages and their disadvantages. The important point is to select the operation for the individual case. Thus, in Scheib's⁴ series, while the great majority were treated by the abdominal method, the vaginal operation was selected in particular cases of cervical carcinoma in the early stage, being diagnosed only by the help of the microscope; it was also the type of operation preferred for all cancers of the body, which appeared limited to the body, and in which the size of the uterus did not present any technical difficulties, and for those cases in which the general condition of the patient forbade the more dangerous abdominal method. Sometimes the vaginal operation was done when the carcinoma was widely advanced, and then, in a number of instances, Schuchardt's method was employed.

Brose⁵ believes that every fat woman should be operated upon by Schauta's method. Strassman⁶ says that the vaginal operation should be selected for beginning epithelioma of the portio. In choosing between the vaginal and abdominal operation, it should not be lost sight of, says the same author, that if the glands are enlarged, the prognosis is very bad. If the carcinoma is an adenocarcinoma of the cervix, the operation should be abdominal, and the glands should be removed as the most important safeguard of the operation.

Van Ott⁷ believes, as the result of a very careful comparison, that the simple vaginal hysterectomy is much to be preferred, from the standpoint of immediate danger, to the advanced vaginal or abdominal operation. Practically, the abdominal operation is eleven times as dangerous, and there is only one and one-half times more hope that the patient will be radically cured. This is more the way the case would appear to the patient than to the physician.

A physician *must individualize his cases of cancer of the cervix*. If the cancer is in the earlier stages, and it is most likely confined to the

¹ Loc. cit.

² Loc. cit.

³ Zentral. f. Gyn., 1909, No. 19, p. 673.

⁴ Loc. cit.

⁵ Loc. cit.

⁶ Loc. cit.

⁷ Zeit. f. Gyn., 1909, No. 40, p. 1394.

cervix, a simple vaginal hysterectomy should be selected. For cases in which there is a surface spreading of the process to the vaginal wall, the advanced vaginal method should be chosen, because it gives or makes possible the widest resection of the vagina. Finally, where it is probable that the disease may have extended into the parametrium, the abdominal operation should be selected. In particular cases, combined methods may be used.

COMPUTING THE RESULTS OF CANCER OPERATIONS. It is of paramount importance, in tabulating the results of cancer operations, to follow the cases as closely as possible afterward. An indication of the exactness of Wertheim's¹ statistics is the fact that not a single case has been lost sight of. He thinks that those lost sight of must be considered as recurrences, and those dying intercurrently dare be excluded only when it is demonstrated by autopsy that there is no recurrence.

Reinecke² attempted to examine personally or to correspond with each patient. He ascertained the general condition of the patient since operation, whether she had developed a tumor in the lower abdomen; if so, how long after the operation, and whether it had been operated upon again. When he found that the patient had died, he tried to obtain information as to the date and cause of death. With the exception of nine cases, he was able to obtain the desired information.

Klein,³ in calculating the absolute percentage of cures of carcinoma, takes into account the number of cases observed within a given time, the number operated upon radically, and the number which are certainly free of occurrence after five years. The discounting of those which have been lost sight of should be avoided.

THE RESULTS OF VARIOUS OPERATIONS. Wertheim, who is the chief advocate of the abdominal method, reports that of 487 cases operated upon by his method, 200 are over five years old. There was a mortality of 24.5 per cent. in these five-year cases, and an absolute cure of 19.3 per cent. In the last 200 cases the mortality has fallen to 10 per cent., the operability has increased to 60 per cent., and Wertheim expects an absolute cure of 30 per cent. Mackenrodt⁴ says that the mortality of the abdominal radical operation for carcinoma of the cervix has fallen to 10 or 12 per cent. Martin,⁵ from an experience with 195 cases of cancer of the cervix, would say that all those in which there was no infiltration of the parametrium and no nodular formation toward the rectum, gave 100 per cent. of *primary* cures; the advanced cases about 57.6 per cent. The *ultimate* cures of the primarily

¹ Loc. cit.

² Loc. cit.

³ Zentral. f. Gyn., 1909, No. 42, p. 1451.

⁴ Ibid., No. 17, p. 593.

⁵ Ibid., No. 28, p. 976.

healed cases averaged about 50 per cent. after a period of two years. According to the Waldstein formula, the percentage of permanent cures was about 19 per cent. Schauta¹ has performed his radical vaginal operation in 336 cases, with an operability of 47.7 per cent., a mortality of 10.7 per cent., and 10.4 per cent. of accidental injuries. The permanent cures after five years were 39.5 per cent. The absolute percentage of cures according to Winter, after five years, was 13.4 per cent. Zweifel² reports that in 357 radical operations for cancer performed after the plan of Wertheim, he had a mortality of 13.1 per cent. In 240 vaginal operations for carcinoma there were 14 deaths.

In 11 of Jayle's³ cases the carcinoma was confined to the uterus or cervix, and after three years there was no recurrence. In 17 cases in which the carcinoma had already involved the vagina or the connective tissue, 5 died as the result of the operation; 9 of those who lived died from a recurrence. Jonnescu,⁴ between 1899 and 1907, operated upon 110 cases of uterine cancer; 81 recovered, and 29 died. But 19 have been kept track of; 14 of them remain free of recurrences. The duration of observation varies between one year, two months, and ten years.

Scheib⁵ bases a very extensive paper upon the material of the clinic at Prague, in the service of Professor von Franque and Professor Kleinhans, from the first of April, 1903, to the end of September, 1907. There were 149 cases of carcinoma of the cervix operated upon by the abdominal route, and 31 cases operated upon by the vaginal route. Scheib reports 30 primary deaths in 149 cases of carcinoma of the cervix in which the radical abdominal operation was carried out. This is an immediate mortality of 20.1 per cent.

In order to find the percentage of permanent cures, the cases operated upon by Kleinhans in the years 1901 and 1902 were taken, and these, after five years' observation, gave a permanent cure of from 23.5 to 28.5 per cent. The absolute percentage of cures for five and six-year cases, those of Kleinhans, lay between 3 and 5 per cent. The good primary results of the last two or three years would lead Scheib to believe that the absolute cures would not be under 10 per cent. after the cases have been observed for five years. In the cases of vaginal extirpation the primary mortality was 5 to 8 per cent., the frequency of injury to the urinary organs averaged from 3 to 10 per cent., and the permanent cures, after four years, were 16.6 per cent.

Reinecke⁶ reports Hofmeier's experience with carcinoma of the cervix in the clinic at Würzburg. From 1889 to 1898, total vaginal extirpation was employed, and, in suitable cases, high amputation.

¹ Loc. cit.

³ Loc. cit.

⁶ Loc. cit.

² Loc. cit.

⁴ Loc. cit.

⁶ Loc. cit.

Since that time, the advanced abdominal operation has been used in most cases with the exception of particular ones which did not appear suitable; for instance, when the abdominal wall was very thick or when the woman was old. For an estimation of the permanent result, only the cases admitted up to 1903 are considered.

One hundred and twenty total vaginal extirpations were performed with 16 primary deaths; 8 patients have been lost sight of, and 3 have died from intercurrent diseases. Of the remaining 93 cases, 31 are free of recurrence. In the 93 operations the bladder was injured eleven times, and the ureter once. Twenty-seven cancers were operated on by the advanced radical operation; none of these have been lost sight of, and none have died of intercurrent diseases. There were 7 primary deaths, and of the 20 remaining, 11 are free of recurrences after five years. The high primary mortality in these first 27 operations has been diminished by a more perfect technique, so that in the last 28 operations they have had but two deaths. In 6 patients high amputation of the cervix was done. There was no mortality; 4 have remained free of recurrence, 1 had a recurrence, and 1 was lost sight of. Of the entire number of cases, they have an absolute percentage of cure, according to the Winter formula, of 10.52 per cent.

He makes the observation that recurrences usually follow in patients who have had severe hemorrhage, or prolonged suppuration during or after the operation. It is quite natural that this should be so, for these complications occur most often in the worst cases.

Von Ott¹ compares the advanced radical abdominal operation, the advanced vaginal operation, and the simple vaginal operation for carcinoma of the cervix. He believes that an estimate of the value of the three methods should be founded not alone upon the number of patients which are permanently cured, but also upon the immediate danger which is associated with each one of them. A diminution of the primary mortality is the first requisite, and then the freedom of recurrence for a period as long as five years.

He has compared 116 cases of Wertheim, 58 cases of Staude, 47 cases of Schauta, and 191 cases of his own, which have been operated upon for five years or more. Wertheim's cases represent the advanced abdominal operation; Staude's and Schauta's, the advanced vaginal operation; and his own, the simple vaginal operation. He tabulates the primary mortality, the operability, the permanently well, the cases lost sight of, those kept in view for five or more years, and the absolute percentage of cure according to Winter, and according to Waldstein; also the frequency of injury to the neighboring organs.

¹ Loc. cit.

The following comparison may be taken from his table:

	Advanced abdominal method (Wertheim).	Advanced vaginal method (Staude). (Schauta).	Simple vaginal method (Ott).
Cases operated upon for five years or more	116	58	47
Deaths following operation	27	9	9
Mortality.	23.3	15.5	19.1
Cases kept in view for five or more years	87	41	34
Absolute percentage of cure according to Winter	24.7	23.0	16.7
Absolute percentage of cure according to Waldstein	19.16		13.5
Frequency of injury to the neighboring organs	8.9	11.6	9.2
			0

POSTOPERATIVE CYSTITIS, VESICAL, URETERAL, AND RECTAL INJURIES. Franz¹ reports the postoperative complications of the bladder and ureter in 145 radical operations for cancer of the uterus by the abdominal method.

Cystitis occurs almost as a rule. In 123 cases there were but 20 per cent. which did not have cystitis. The chief cause of cystitis is not catheterization, but a disturbance of the nutrition of the bladder wall caused by the operation. The prophylaxis of cystitis, therefore, must consist of limiting the extent of the operation. The preservation of the vesical branch of the uterine artery had no effect upon the occurrence of cystitis. The distention of the bladder with boracic acid solution, as advised by Werth, and irrigation after catheterization, had no effect. The best prophylactic was the use of a permanent catheter, which was introduced on the fourth day following operation after the bowels had been moved. It was allowed to remain from nine to fourteen days. Urotropin and uva ursi were of use. Irrigations of nitrate of silver were employed only when the urine was purulent.

Vesicovaginal fistula resulted in 13 cases from the giving way of sutures, and five times from necrosis of the bladder wall. In those fistulæ due to injury of the bladder no drainage of the connective tissue was used, and the bladder was always prevented from functioning by a permanent catheter. In spite of this, only 1 out of 15 cases of sutured injuries healed. This can only be from the same cause which resulted in the injury, that is, an unusual friability of the bladder wall due to inflammatory infiltration. Three of the fistulas healed spontaneously from thirty to forty days after operation; 7 were operated upon with good results. In the 5 fistulæ due to necrosis, no tampon or drain had been used. One fistula healed spontaneously after three

¹ Zentral. f. Gyn., 1909, No. 17, p. 600.

months; one, forty-four days after operation, also spontaneously. One was operated upon without avail; one died half a week after the operation, and one refused treatment.

In 145 operations there were 7 cases of *ureteral necrosis* with the formation of fistulæ. The chief cause of ureteral necrosis was pressure from drainage material and superficial injury of the ureteral wall. The ureteral vessels must be preserved, but one does not need to be afraid of freely exposing the ureter while it is still attached to tissue. Two of the ureteral fistulæ healed spontaneously; 2 cases were treated by abdominal implantation of the ureters into the bladder; in 1 of them, the operation was bilateral. One had a recurrence later; the other died two years afterward from pyelonephritis. Sixteen times the ureter was cut through and subsequently implanted into the bladder, thirteen times unilaterally and twice bilaterally; 7 of the women died at the conclusion of the operation; the other 9 are all well, and all of the ureters functionate normally.

Scheib¹ lays special stress upon the gravity of *accidental injuries* during operation. They are of considerable importance in respect to the primary mortality and the prognosis. In 18 cases there were vaginal and cervical injuries with five deaths. In two-thirds of these cases it was not possible to prevent a contamination with the septic secretion of the cancerous crater. In 16 cases, the bladder was wounded during the operation. In 15 cases, ureteral and vesical fistulæ appeared during convalescence. Altogether, 21 urinary fistulæ were observed. There were 6.6 per cent. of injuries to the rectum, and 3.6 per cent. of rectal fistula. The number of penetrating injuries of the urinary organs and the intestine together reached 32 in 166 advanced radical hysterectomies for carcinoma of the cervix; 6 of these cases died within a few days (18.7 per cent.). The primary mortality of such accidental injuries makes the prognosis, therefore, quite grave. They are caused almost always by inflammatory alterations or carcinomatous infiltration of the affected tissues.

MEDICAL TREATMENT OF CARCINOMA. There are the usual number of writers who report success in the treatment of carcinoma by general or local medicinal treatment.

Gellhorn² notes the futility of most of the measures which have been used for inoperable cancer of the uterus. Cataphoresis has never gained a foothold, the *x*-rays are of no avail, and the latest method, "fulguration," has been followed by distressing failures.

From a practical standpoint, the foul odor is the most serious symptom of inoperable cancer. It is the result of the action of saprophytic bacteria upon the cancerous cells. The necrotic masses are commonly removed by curettement and cauterization. This has good results

¹ Loc. cit.

² American Journal of Obstetrics, May, 1909, p. 799.

in a few instances; in the majority of cases the benefit is of very short duration. Chemical cauterization is no better than thermocauterization, and the action of chemicals is quite beyond the control of the surgeon. The whole idea of cauterizing is faulty, for by it is produced a necrosis of the living cancer cells, the very thing to combat. How can a spontaneous necrosis be relieved by an artificial one?

The author mentions artificial occlusion of the vagina, as invented by Keustner and Gottschalk, only to deplore it. In the same category, he places ligation of the hypogastric arteries, first proposed by Pryor, and later taken up by Kroenig. He believes that the future treatment of inoperable cancer will be found along the line of biological or biochemical research.

Acetone Treatment of Cancer. At the present time acetone is the most effectual substance to apply to an inoperable carcinoma. In a still limited number of cases it has relieved the most loathsome symptoms. It has checked hemorrhages, otherwise uncontrollable, and in a simple and harmless way restored a large percentage of patients to a period of comparative ease and bodily comfort. The acetone treatment is always preceded by a thorough curettement of the ulcerated area. The cavity is then carefully dried with cotton, and from one-half to one ounce of pure acetone is poured into the wound through a Ferguson or other tubular speculum. For this purpose the pelvis of the patient must be raised as in Trendelenburg's position. The anesthesia may now be discontinued, and the patient left in Trendelenburg's position for from fifteen to thirty minutes. The acetone is permitted to run out by lowering the pelvis, and the cavity is packed with a narrow strip of gauze soaked in acetone. The healthy mucosa is cleansed with sterile water and dried, and a cotton tampon is inserted to absorb any excess of acetone.

Further treatment is administered twice or three times a week, beginning on the fourth or fifth day after operation. It may be done without anesthesia, the patient being in bed or upon the ordinary office examining chair or table. With the progressive diminution of the crater, smaller specula are gradually employed. The vulva and perineum should be protected with a thick layer of vaseline. By this application the hemorrhage is checked, the intense odor is reduced, the discharge becomes more watery and gradually disappears, and after two or three weeks of treatment a considerable shrinkage of the crater is noticeable. Sensations of pain caused by the extension of the cancer to adjoining organs or to nerve trunks beyond the reach of the acetone are not relieved. For such pain the use of anodynes is required. Maier has found that the pain usually yields to aspirin.

Keith¹ remarks that as at the present time surgery claims the treat-

¹ British Medical Journal, July 17, 1909, p. 140.

ment of all early cases of cancer, and allows the trial of other remedies when it has failed, he hopes to show the good result of medical treatment on an early case, after an extensive experience with hopeless cases rendered this permissible. He disclaims any intention to suggest a prolonged course of medical treatment in any case suitable for operation. The treatment should be limited to a few weeks. He believes that the indication of improvement may be found in examinations of the blood. The drugs he uses are arsenic, iron, and sodium cinamate. The best preparations which he has found are soamin, citrate of iron, and ammonium, and a saturated solution of sodium cinamate. Soamin is an arsenical compound, and contains 28 per cent. of arsenic. He reports a case of what apparently was an inoperable carcinoma of the rectum, which was caused to disappear in two months. He reports a letter from Dr. Tabes, of New York, reporting two favorable cases. There are no data, however, to prove any of them, and in Keith's own case no microscopic examination was made. The drugs he mentions are given by injection. The dosage and technique are not stated.

Fenwick wishes to make a preliminary report of a number of cases successfully treated by the use of *injections of bichromate of potassium* into the substance of the tumor. The dose used was from 7 to 10 minims of a sublimate solution. In some cases 15 minims were injected. He has treated about 25 cases of cancer by this method. The author says that the method is simple, inexpensive, and within the means of the humblest patients, and he can conscientiously say that for rodent ulcer and epithelioma the treatment is lasting in its effects and curative. He hopes to elaborate the plan of treatment in a subsequent communication.

Becker¹ reports the treatment of three cases of inoperable cancer with hypochlorites. The first case was that of a woman, who, in October, 1901, had the right ovary removed at Guy's Hospital. She continued to fail in health, and was readmitted in November, 1902. Upon laparotomy, a mass was found in the pelvis suggesting a malignant growth, with a secondary deposit in the omentum. No microscopic examination was made, but, from the relations of the mass and its appearance, it was concluded that it was a case of malignant disease. Consequently, the abdomen was closed without further interference, and the patient discharged in February, 1903.

Ten months later, or in December, 1903, the special treatment in question was commenced. By May, 1904, five months later, the patient was so far recovered that she was able to do all her household work and to go out bicycling, riding as far as thirty-five miles a day. In appearance and feeling she was perfectly well. Nevertheless, the

¹ British Medical Journal, January 30, 1909, p. 274.

treatment was continued for several months longer. At the date of writing, four years later, this patient is still in good health and earning her living by her own exertions.

The second case was that of a woman who had a radical operation for cancer of the breast, at Guy's Hospital, in March, 1907. The diagnosis of cancer was verified by microscopic examination. Two months later some enlarged glands were noticed on the left side of the neck. These were removed surgically. Further growth was observed within two months in the same locality. At this time, special treatment was commenced. In two months the growth had disappeared, and at the time of writing, eighteen months later, she was in perfect health.

The third case was that of a man, who, following traumatism, developed a growth of the right breast, which was removed in May, 1904, at King's College Hospital, the disease on microscopic examination being found to be a spheroidal-celled carcinoma. He was seen now and then by his surgeon in 1906. Although the cicatrix seemed in good order, the conclusion was reached by this surgeon that there was a secondary and inoperable growth in the sternum itself. The patient had *x*-rays applied and received some injections of what was probably a culture of *micrococcus neoformans*.

Finally, in November, 1907, the author commenced special treatment, which continued until May, 1908, at which date all evidence of newgrowth had disappeared and the patient was apparently in perfect health, locally and generally. He continues to be so at the present time.

The treatment employed was the injection of a solution of hypochlorites of potassium and sodium. This is prepared by dissolving 5 grains of potassium hydrate and 4 grains of sodium hydrate in a liter of distilled water, and passing it through washed chlorine gas. Of this solution, $1\frac{1}{2}$ to 2 c.c. are injected daily for a varying period, usually under the skin over the deltoid muscle or over the great trochanter, so that the solution may enter the system at a site in the general neighborhood of the lymphatic glands. The growth itself and the skin over it are carefully avoided. So, too, is the use of alcohol during treatment. An ordinary all-glass syringe is used with a platinum needle, to avoid corrosion, and in making the injections ordinary aseptic precautions are adopted. There is a varying amount of local pain, lasting for from two to five minutes.

The Treatment of Retrodisplacement of the Uterus. Baldy¹ holds, as an absolute fact, that retrodisplacements of the uterus are mostly coincident with other lesions, and, where such is the case, the symptoms almost universally come from the associated disease. He thinks that the expression, "the treatment of retrodisplacement," conveys

¹ Surgery, Gynecology, and Obstetrics, April, 1909, p. 421.

a mistaken idea. It should be, "the treatment of conditions in connection with which retrodisplacement of the uterus occurs as an incident."

When the associated lesion has been found and dealt with by appropriate treatment, and it is desirable to hold the uterus in a normal position so that raw surfaces will not come together and produce adhesions, or where it is advisable to draw up the prolapsed ovaries and tubes, the author has been employing a form of operation which he



FIG. 32

believes satisfactorily restores the uterus to its normal position. He says that long and learned articles have been written concerning the supports of the uterus, and numerous theories have been propounded as to the relative influence of each in the production of the lesion, nevertheless, in the confusion of anatomy, physiology, and pathology, sight is lost of the truth, which is, that in the vast majority of cases there is a general relaxation and stretching of all of the pelvic supports, often of the entire abdominal content, and the uterus as well as the ovaries lie down,

as it were, in the pelvis, limp and inert, the overstretched ligaments being comparable to overstretched rubber, not to hypertrophied tissue which may subsequently involute.

The round ligaments have been used by surgeons as supports of the uterus in an artificial manner in imitation of what nature originally accomplished, namely, a uterus with the fundus forward of the axis of the pelvis, freely movable in all directions on the cervix as a movable

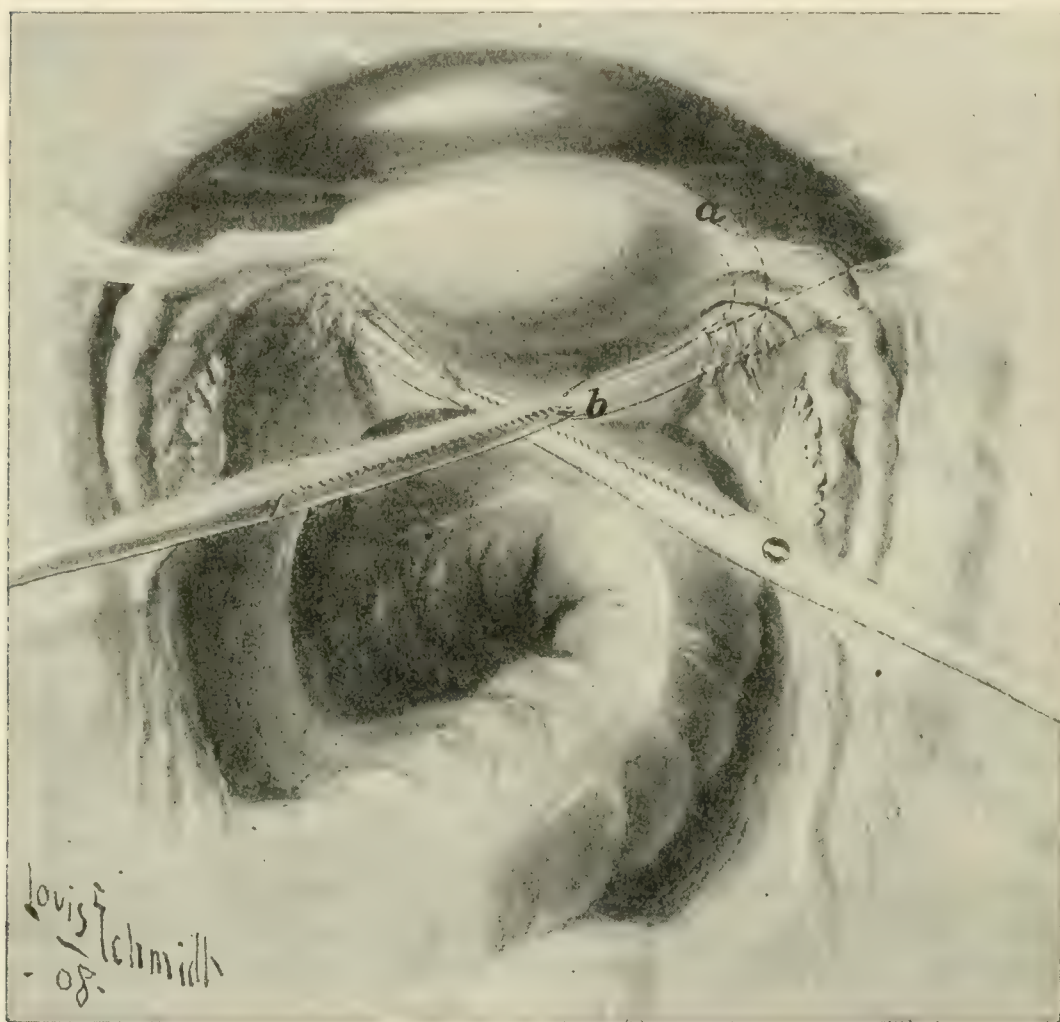


FIG. 33

pivot, the fundus raised high up to and above the ileopectineal line, and the ovary swung correspondingly high and free from the posterior side of the broad ligament.

Baldy has devised another method of using the round ligaments as a means of support. He draws them around the posterior side of the uterus, fastening them together as they meet, and then attaching them to the uterus itself. This plan fulfils perfectly each and every indication. The technique of the operation is indicated by the illustrations (Figs. 1, 2, and 3). It may be noticed by a reference to them that the forceps are made to perforate the broad ligament close to the uterus and

directly under the ovarian ligament. This is essential to the best results. A perforation too low in the broad ligament will give an unsatisfactory result. When the round ligaments are adjusted and brought snugly together posteriorly, the ovarian ligament rests on each round ligament and, without so much as touching the ovary or Fallopian tube, always and with absolute certainty insures the proper and safe elevation of those organs.

This is the only operation of which Baldy knows which secures such a result, and, if the fact is realized that it is often the prolapsed ovary which



FIG. 34

induces the symptoms, the great advantages of the operation must be readily recognized. When the uterus is thrown forward by almost any operation, the ovary will usually rise in the pelvis with it, and the displacement of both organs will be corrected at one and the same time. But every operator will admit that there is a certain large group of cases in which the ovarian ligaments are relatively more stretched than those of the uterus, and in spite of the fundus being brought forward, the ovaries will still be prolapsed.

The moment the uterus attempts to leave its forward position, after being suspended by Baldy's plan, it meets with the resistance of the encircling ligaments as well as the forward and downward pull at the anterior cornual attachments. It thus rides in a cradle, as it were, movable backward and forward without ever being able to get back beyond its centre of gravity, or posterior to the axis of the pelvis. Hence the third force at play, the intra-abdominal force, is constant in its pressure upon the posterior surface of the uterus, and thus trebly insures a permanent result. But one possible thing can happen to spoil the operation—the complete breaking down of the suturing, which is so simple as to make that accident inconceivable.

In adjusting the ligaments as they are brought together back of the uterus, care must be taken, first, to draw the inner circle of the doubled ligament snugly about the uterus as the organ is held in good anterior position by the hand. They are then sutured together by a single stitch. The last step is to fix the loop to the uterus by a stitch or two at a point which will insure an anterior position. It is best not to make the attachment at a point higher than necessary to be sure that the fundus cannot double backward over the encircling round ligaments. This point is found with little difficulty. If this precaution is not followed, the result may be unsatisfactory.

The author and his assistant have performed the operation between one and two hundred times. He has knowledge of some twenty to thirty pregnancies following the performance. In no case was there the slightest irregularity, although some of the women had had trouble in former pregnancies. In no case subsequently examined could it have been told that an operation had been performed had it not been known.

Pretschker¹ reports the result of the Alexander operations, performed in the Breslau clinic between 1898 and 1908. The operation was used only for movable retroflexions, which had been replaced and held in position by means of a pessary. Until 1900, the vaginal process of the peritoneum had not been opened in the course of the operation. Since that time it has been opened and the ligament has been drawn farther forward. The pessary is allowed to remain for a period of from four to five weeks after the operation. One hundred and forty-seven women were operated upon up to 1906. Early in 1908 71 women were examined; 32 could not be found; 3 had died from intercurrent diseases; it was impractical to examine 41, but they felt entirely well. Of the 71 women examined, the uterus in 68 was in normal position; in 3, there was retroposition; in 68, the peritoneum had been opened as a definite step in the performance of the operation, and all showed the uterus in good position; 28 of the 71 women had

¹ *Zentral. f. Gyn.*, 1909, No. 20, p. 710.

been pregnant and had borne 51 children; 10 had aborted. Of these 10 women, however, 7 also had had normal pregnancies. Inguinal hernia occurred in 1 case. The symptoms of which the woman had complained before operation were not benefited in 7 cases.

Benjamin¹ has devised a modification of the Gilliam operation. He first dissects the skin and subcutaneous tissue from the abdominal incision to a point opposite the internal abdominal ring, passing a curved forceps through the fascia at this point between the folds of the broad ligament to within an inch and a half of the horn of the uterus, catching the ligament, which, together with its peritoneal covering, is brought out on the abdominal wall, spread on the fascia in fan-shape, and anchored by three or four interrupted chromic catgut sutures.

The anterior fold of the peritoneum can be pulled out to any extent, making any tension desired. In young women, the author is in the habit of making a transverse curved skin incision at the border of the pubic hair line and a longitudinal incision through the underlying tissue. The after-care of these cases is important. General visceroposis may be corrected by a properly fitting long, straight-front corset; the intra-abdominal tension by restricting the diet and regulating the bowels. Menorrhagia or metrorrhagia should be combated by rest and medication. An inflamed or congested cervix is benefited by hot astringent douches.

Young² describes what he speaks of as a new technique for shortening the uterosacral ligaments. The fundus is fixed by a tenaculum and held well under the symphysis, so as to rotate the uterus and lift the lower segment. The ligament on either side may be grasped in its midportion by a long abdominal sponge-holder and drawn well into view, its length and condition inspected and the necessary amount of shortening determined. A stitch is then introduced through the uterine wall at the insertion of the ligament, taking care to embrace enough uterine tissue so that the suture may be used as a means of traction without fear of tearing. By drawing upon this stitch and upon the sponge-holder already in place, the ligament is brought well into view. It should then be grasped between the finger and thumb.

If the ureter is felt between the folds it should be pushed aside so as to avoid including it in the stitch. The ligaments are folded upon themselves anteroposteriorly, and united by stitches which include the three apposed parts of the ligament. After placing three through-and-through sutures, the top of the reduplicated ligament is sewed over with a running stitch. The author uses chromic catgut for the interrupted sutures and plain catgut for the running sutures.

¹ Journal of the American Medical Association, 1909, vol. liii, p. 1072.

² American Journal of Surgery, March, 1909, p. 73.

Dysmenorrhea and Sterility. Herman¹ recommends for dysmenorrhea the use of guaiacum resin, 10 grains, three times a day. It should be started a week before menstruation is expected, and continued until the time is past at which the pain usually occurs. It may be given in a mixture, either with milk or with gum tragacanth, or mixed with malt extract, or in a cachet. In some cases this drug will prevent the pain from coming on, or lessen its severity when it does come.

Carstens² continues to use the stem pessary for amenorrhea, premature atrophy of the uterus, dysmenorrhea, and sterility. He warns that such treatment is contra-indicated when there is any septic or inflammatory condition in the pelvis.

Pozzi³ says that the most frequent cause of dysmenorrhea and sterility is a malformation of the cervix in which the os is unduly narrow. It is the result of a certain arrest in development, and co-exists with a type of uterus very similar to the infantile uterus; the cervix is longer in proportion to the length of the body than is normal, and its axis is more or less bent upon the axis of the body, producing ante flexion. The condition is frequently found in badly developed women of frail constitution, but it may be observed also in strong women as a small and absolutely limited malformation without atrophy.

As a result, there is stenosis of the uterus; the bend in the cervical canal causes a flattening of the lumen, and there is difficulty in the drainage of the cervical mucous membrane, the latter especially if there happens to be a slight infection, for then the amount of mucus is increased and its consistency is modified. As a consequence, the mucus accumulates in the cervical canal, which becomes dilated and assumes the shape of a small barrel.

The predominant symptoms in this form of cervical metritis are leucorrhea and dysmenorrhea. The leucorrhea may be intermittent, being noticeable only at the times when the distended cervix empties itself of the mucus. In long-standing cases there may be isolated or agglomerated polypoid vegetations in the cervical cavity. These are always cases of old and very intense dysmenorrhea.

To correct congenital cervical stenosis, especially when complicated by cervical metritis, dilatation is insufficient and illusory. Bilateral section is not sufficient, for healing gives rise to renewed stenosis. An operation is needed which will give a lasting result and will not produce infection, and Pozzi thinks he has devised such an operation.

He first splits the cervix laterally, for 2 or 3 cm. on each side. The cervical canal is dilated, and curettage is performed. He excises from the raw surface on each side of the cervical canal, and upon both lips, a wedge of tissue between the mucosa of the cervical canal and the

¹ British Medical Journal, April 17, 1909, p. 937.

² Journal of the American Medical Association, vol. liii, p. 1730.

³ Transactions of the American Gynecological Society, 1909, p. 360.

mucosa covering the vaginal portion of the cervix. He unites, upon each lip, the mucosa of the cervical canal to the corresponding edge of the vaginal mucosa covering the cervix. It can be seen from this description that what Pozzi does is to practically produce the same anatomical condition which results from bilateral laceration of the cervical lips, with resulting exposure and eversion of the cervical mucosa.

He says that for the first few days after the operation the cervix presents a peculiar aspect, similar to a duck's beak. The two lips are separated like two little valves, but very rapidly, owing to the progress of cicatrization, retraction begins, and the cervix is quite like it would be after confinement without laceration. He obtained the most satisfactory results. Success is universal as regards dysmenorrhea, which is immediately and definitely cured. Cervical metritis, evidenced by leucorrhea and due to stenosis, rapidly disappears. As regards sterility, in more than 25 per cent. of the cases pregnancy followed the operation, going to term without any accident, labor being normal. Rigidity of the cervix is not to be feared, for there is no cicatricial tissue, as after some amputations of the cervix.

Runge¹ believes, with Bumm, that about two-thirds of sterile marriages are due not to gonorrhea, but to malformations.

He has made a series of systematic examinations to determine the nature of these malformations, and has especially studied *the importance of a well-developed posterior vaginal fornix*. He has tried chiefly to determine whether, and for what length of time after coitus, spermatic particles remain in the secretion of the vagina, the cervix, and the body of the uterus, and to compare these findings in the normal individual with those having infantile development.

The experiments were carried out in the following way:

Patients complaining of sterility were first examined to exclude high-grade alterations of the genitalia, especially of the adnexa, which would make the occurrence of pregnancy impossible. The husband was suitably inspected to determine the presence of spermatic particles in sufficient number and of sufficient activity. If they were satisfactory, the wife was directed to come to the clinic six, twelve, and thirty-six hours after sexual connection. Without previous digital examination, the posterior vaginal vault was exposed by means of a speculum, and some of the secretion obtained for examination. The portio was then cleaned, and with a syringe the secretion from the cervix was collected. Next, the cervical canal was carefully cleaned and dried, and the syringe nozzle introduced into the cavity of the uterus and the contents of the uterine cavity obtained.

To determine how long fluid would remain in the posterior fornix, the patient was put in a suitable position, and an injection was made

¹ Archiv f. Gyn., 1909, Band lxxxvii, Heft 3, S. 572.

of from 5 to 10 c.c. of a methylene blue-colored slimy fluid. Examinations were made ten, fifteen, and thirty minutes afterward, to see how much of the solution had escaped upon a suitably disposed pad, and if there was any doubt about the matter, a speculum was inserted and the remainder of the fluid was taken up by means of sponges.

No marriage was considered sterile until after two and one-half or three years. Sixty-six women were examined who had never been pregnant, and then, as a control, 17 women who had had children. In the 66 women, no spermatic particles could be found in any part of the genital tract in 34, or 51.5 per cent. In women who had borne children, there were only 3 in which none could be found, or 17.6 per cent. None were found in the posterior vaginal fornix in 77.7 per cent. of the sterile, and in 25.5 per cent. of the parous women. None were found in the cervix in 74 per cent. of the sterile, and in 37.5 per cent. of the parous. None were found in the body of the uterus in 88.5 per cent. of the sterile, and in 40.6 per cent. of the parous. The findings are especially striking six hours after coitus. At this time, all women who had children and were normal gave spermatic particles, whereas, in more than half of the sterile women none were present.

The author concludes, that the configuration of the posterior vaginal fornix is a most important factor. In the treatment of these cases there are two objects: (1) To set aside any narrowing of the cervical canal; and (2) to prevent the premature escape of spermatic fluid from the fornix. The function of the fornix in this respect was assisted and increased by elevation of the pelvis during coitus, by tampons of gauze, by massage, by a colpeurynter filled with mercury, by a suitable pessary, and by an operation which consisted of dividing the mucous membrane transversely and sewing it together in the longitudinal axis.

The author, as far as results are concerned, says that four of the patients have become pregnant. He does not believe that this is the full number, because it is hard to have patients continue to come after they have attained their wish. His observations were made in 1906 and 1907. The paper was published in 1909. He tabulates his results in 66 cases.

The Time to Operate on Pelvic Inflammatory Cases. Simpson¹ propounds three questions concerning the treatment of pelvic inflammatory diseases: (1) Will operation always be necessary for complete restoration of health, comfort, and functional activity? (2) If operation is decided upon, will the coincident occurrence of acute illness and operation entail more or less danger than their separate occurrence? (3) If an interval operation is decided upon, by what means may we determine that a safe time has been reached?

In answer to the first question, he says, that, unquestionably, in the

¹ Transactions of the American Gynecological Society, 1909, p. 161.

graver types of tubal infection due to the gonococcus, the tubercle bacillus or other pyogenic microorganisms which result in pus tubes, tuboövarian abscess, cystic degeneration of the ovaries, and extensive adhesions, operation will be required to prevent permanent invalidism. This class embraces about 10 per cent. of the total number of inflammatory cases.

In a second group, somewhat larger than the first, the tubes and ovaries have been damaged, although the destructive changes are less marked and more likely to be unilateral. In such cases, relatively early removal may readily forestall further attacks and more destructive changes.

In a third group, the inflammatory exudate is absorbed, and the tubal mucous membrane is restored to normal, but the ovary and the tube are bound down by adhesions. These patients suffer from dysmenorrhea and sterility. Operation will frequently be required to relieve them.

In a fourth class, the patient has her organs restored practically to the normal. Such patients include many infections of puerperal origin, the organisms being the colon bacillus, streptococcus, staphylococcus, the bacillus *aërogenes capsulatus*, and the gonococcus.

In reply to the second question, the author believes that operation is much less dangerous after the acute symptoms have subsided, because: "The patient's margin of reserve strength is materially reduced by acute illness of bacterial origin. Cardiac, hepatic, and renal insufficiency are likely to occur with increased frequency and severity if an anesthetic is administered during acute illness from bacterial or metabolic poisons. Interference with a focus of acute inflammation is likely to spread infection and materially increase technical difficulties. The disease properly treated very rarely causes death. It is possible in the vast majority of instances for the patient to develop a degree of immunity which may, and, as a rule, probably does, lead to the actual internal sterilization of pus. The safe time to remove the products of inflammation is not at the height of the attack, but after it has subsided."

In reply to the third question, the author believes that a safe time may be chosen with almost mathematical precision by strictly clinical methods. For a number of years his decision has been made in accordance with the following rules: "The patient shall have recovered from her acute illness, and shall have regained a satisfactory margin of reserve strength. The temperature shall not have risen above normal a single time for a minimum period of three weeks. The inflammatory exudate surrounding the focus of infection shall have been completely absorbed. There shall have been no marked or persistent rise of temperature following a careful bimanual examination."

In 465 consecutive abdominal sections for inflammatory trouble

of tubal origin, 3 died; 6 were critically ill; 17 were seriously sick; 12 had stitch abscesses; 3 had fecal fistulæ; 1 had intestinal obstruction; in 16, convalescence was not normal, there being cellular exudate about the pedicle, intestinal adhesions, etc.

The view of Simpson is shared by Crossen,¹ who says that an abdominal operation for a chronic pelvic inflammatory mass should not be undertaken before a proper period of time, during which the infecting germs become sterile, or at least attenuated, except in those rare cases in which the patient's life is threatened in spite of palliative measures, by the severity of the inflammation, and the infected focus cannot be satisfactorily drained, extraperitoneally. Gonococci die or become attenuated within two to four months of the beginning of the trouble. In streptococcus cases, on the contrary, the bacteria live and retain their virulence indefinitely. Abdominal section for a mass of streptococcic origin, is never safe, and even years after, it may be followed by fatal peritonitis. In doubtful cases, intraperitoneal operation should not be undertaken until the streptococcus is excluded with reasonable certainty. Parametrial infections should be opened extraperitoneally above Poupart's ligament or through the vagina.

He believes that gonorrheal inflammatory pelvic masses may usually be distinguished by the fact that the pelvic inflammation is preceded by evidences of gonorrhea, or comes on without apparent cause, and also by the fact that the lesion is located in the tube, extending thence to the ovary or adjacent peritoneal surface, but not involving the parametrium to any decided extent.

The distinguishing characteristics of streptococcus pelvic inflammatory trouble, is that nearly all the cases can be traced to sepsis following labor or miscarriage. Aside from this, streptococcus infection may be due to curettement or other uterine operation, to intra-uterine application, to sounding, to a stem pessary, to abnormal conditions caused by cancer or fibroid, or to chronic inflammation. Streptococci do not spontaneously penetrate the non-puerperal uterus. He says there are very few exceptions to the rule that streptococcic masses in the pelvis are parametrial in whole or in part. (The author curiously enough says nothing about ovarian abscess or inflammation of the ovary caused by the streptococcus.)

Symptoms of Extra-uterine Pregnancy. Frank² has analyzed the records of 80 unselected consecutive cases of ectopic pregnancy admitted to the first gynecological division of Mt. Sinai Hospital, from December, 1902, to September, 1908.

The disease occurred most frequently between the ages of twenty and thirty. Only 12 had never been previously pregnant, and of these, 6 had been married less than one year. In 40 of the cases, there had

¹ Transactions of the American Gynecological Society, 1909, p. 662.

² American Journal of Obstetrics, February, 1909, p. 211.

been amenorrhea; in 40 per cent. the menstrual periods had not been missed; spotting occurred, however, in 58, while profuse bleeding, or bleeding alternating with spotting, was noted in 27.5 per cent. Pain was complained of in almost every case. In over 60 per cent. the pain was localized in either the right or the left iliac fossa; in the others, over the entire abdomen. The pain was described as cramp-like, knife-like, or cutting. Moderate elevation of temperature was the rule rather than the exception. The pulse was below 95 in 26 cases, below 110 in 29, below 130 in 11, and above 130 in 11. Forty-two cases had ruptured; in 20, tubal abortion had occurred; in 11, there was the formation of a pelvic hematocele, and in 4, the ectopic was unruptured. There was one intraligamentous rupture, there was one abdominal pregnancy, and there was one combined tubal and intra-uterine pregnancy.

The uterus, with but few exceptions, was somewhat increased in size and softened in consistency. In 86 per cent. of the patients a mass was palpable in one of the fornices, or in Douglas' pouch. The mass was usually described as boggy, and was regularly tender to pressure. Eight cases in which no mass could be felt included 2 in collapse, with much free blood, and one early unruptured ectopic. In two instances, the local examination was doubtful. Free fluid or movable dulness in the abdomen were found in only 6 cases. Abdominal palpation was often negative. In many cases, localized or general rigidity was noted.

Morning vomiting and breast changes were repeatedly noted; 32 per cent. of all the patients had fainted one or more times during their illness. Six patients were admitted to the hospital in profound collapse. The lowest hemoglobin estimation was 20 per cent.; the highest, 73 per cent. Only 25 cases were estimated. The white blood count, taken in 22 cases, was normal in 5 cases, and above 11,000 in the remainder.

The author would place the symptoms in the order of significance as follows: A history of spotting; cramp-like pains, especially if localized; fainting; accelerated pulse rate; pallor; enlargement of the uterus, and a mass in its vicinity. Preceding sterility and regular or irregular menstruation are of but secondary importance.

Primary Cancer of the Tube. Norris¹ reports an interesting case of primary carcinoma of the Fallopian tube. He notes that at present there are about 86 such cases on record. Three cases have been found at the Johns Hopkins Hospital, against 400 cases of uterine cancer, and Norris' case has been the only one in the gynecological service in the University Hospital among 2020 gynecological specimens, including 94 cancers of the uterus.

¹ Surgery, Gynecology, and Obstetrics, March, 1909, p. 272.

Secondary cancer of the tube is more frequent, and Norris has found this condition present in 8 cases; five times from cancer of the ovary, and three times from cancer of the uterus. Carcinoma of the tube is one hundred times as rare as carcinoma of the fundus of the uterus. It is usually unilateral. About once in every 4 or 5 cases it will be found to be bilateral.

Histologically, cancer of the tube may be either papillary or alveolar. The papillary is the more frequent. Inflammation usually precedes the cancer. The condition may occur as a degeneration of a benign papilloma, but is usually primarily malignant.

The tumor is of rapid growth and gives early metastasis. The symptoms are watery, blood-stained leucorrhea and atypical hemorrhage, usually occurring in patients between forty or fifty years of age. The symptoms are often masked by those of a preëxisting pelvic inflammatory disease. The pelvic examination usually reveals a condition simulating pelvic inflammatory disease.

When operating on patients who are at the cancer age for pelvic inflammatory disease, the tube should be opened before the abdomen is closed, and if a papilloma is found, a radical operation should be performed. A tube, the seat of a cancer, usually resembles a hydrosalpinx until the contents are examined.

End Results of Ovariectomy for Ovarian Tumors. Hofmeier¹ has investigated the later results of ovariectomy for ovarian tumors. He divides ovarian tumors into two groups. The first includes:

(a) Retention cysts (Graafian follicle and corpus luteum cysts), and cystoma serosum simplex.

(b) Fibroid tumors.

(c) Dermoid cysts.

(d) Adenocystoma pseudomucinosum.

(e) Carcinoma.

Retention cysts, dermoid tumors, and fibroids are local diseases, and their removal is merely of local importance. Bad consequences, either physiological or pathological, will not follow the operation.

Adenocystomas are usually benign. As it is utterly impossible, however, to examine all parts of such a tumor, a small malignant part may be overlooked. As a rule, they do not tend to invade the surrounding tissue, give metastases, or recur. Occasionally, such a tumor may develop in an ovary years after the removal of a tumor from its fellow. Special precautions should be taken during operation to avoid the implantation of portions of such tumors in the wound or peritoneal cavity, because some have a tendency to grow. Whether this is likely or not in a particular tumor is hard to tell from a gross examination.

A great many bilateral *ovarian carcinomas* are metastatic from other

¹ Transactions of the American Gynecological Society, 1909, p. 333.

organs, especially the stomach and the intestines. The end result of ovariectomy for primary carcinoma of the ovary is generally bad. Even the primary result is much worse than for other ovarian tumors. While Hofmeier had an immediate mortality of from 2 to 3 per cent. in ordinary ovarian tumors, in the malignant cases it reached 25 per cent. More than half of the surviving patients died during the first year.

From the study of his cases, he is convinced that if the second ovary is removed when it appears healthy in young women, and microscopic examination indicates that it is affected, a relapse will occur in spite of removal. If the ovary really is healthy, a cure is possible without disturbing it. The wish of the patient or her nearest relative should be consulted in such cases. When the second ovary also is grossly affected, only a few rare cases are known in the literature where death has not occurred during the first year after the operation. Nevertheless, operation should be attempted in all cases where removal seems possible. In bilateral cases, the uterus should be removed with the ovary.

Resection of the ovary in *adenocystoma-pseudomucinosum* should be done only if the patient is ready to run the risk of a second operation later. It is absolutely forbidden in carcinoma, but may be employed in cases of retention cyst, fibroid, and dermoid.

In the second group of ovarian tumors, Hofmeier includes:

- (a) Adenopapilloma serosum.
- (b) Pseudomyxoma.
- (c) Sarcoma.
- (d) Teratoma.

The *papillary serous cystoma* is not regarded as malignant. In spite of the most suspicious symptoms, it lacks the anatomically malignant characteristics, viz., tendency to invade and to destroy the surrounding tissue, the faculty of causing metastases through the blood and lymphatic vessels, and a fatal influence on the general health. The implantation growths on the peritoneum, found occasionally at operation, remain for a long time unchanged, and may disappear after the removal of the chief tumor. Although these anatomically malignant qualities are absent, the tumor may have a permanently injurious effect on the health by giving rise to local symptoms, by growing again on the peritoneum or on the second ovary, and by causing repeated accumulation of fluid in the abdomen. These possibilities, and especially the undeniable tendency of the other ovary to be affected in the same manner many years after, weaken the prognosis of the operation considerably.

It is an open question whether the papillary implantations may become carcinomatous or not. Hofmeier has never known of such a case, and he believes that in such reported occurrences the primary tumor was originally carcinomatous, but of a papillary form. In spite

of abundant peritoneal implantations and bilateral growths, cure is possible, but the general state of health may be seriously impaired, and death may result, in spite of the anatomically benign nature of these tumors, from a return of the disease in the pedicle, further development of peritoneal implantations with copious secretion, or affection of the other ovary. This dubious prognosis will not be improved by trying to destroy the implantations during the first operation. For where that would be possible it would be unnecessary, and where it would be very necessary, it would be impossible.

Pseudomyxomata are caused by the bursting of a pseudomucinous cystoma which has very thin walls. The tough and sticky mucilaginous contents are discharged into the peritoneal cavity, adhering and causing implantation to the entire peritoneum, including that of the intestine, even if ovariectomy is performed it is impossible to leave the peritoneal cavity clean. Notwithstanding, recovery is undisturbed in most cases and the final result is good. In some instances there is a tendency for the implantation to invade the adjacent tissues and organs, and their destruction is often difficult on account of the deep and subserous development. Repeated operations will often be necessary. The result of operation when a pseudomucinous cyst is complicated by a pseudomyxoma is much more uncertain than when it is uncomplicated.

Sarcomas differ in their malignancy, according to the histological structure. The fibrosarcomas are benign, but in statistics they are not always separated from the true sarcomas. True sarcomas include myxosarcoma, endothelioma, perithelioma, and form about 7 to 8 per cent. of the cases.

Teratoma are among the rarest of ovarian tumors. They contain tissues from all three germ layers, promiscuously mixed, and are of the most variable character. Opinions concerning their malignant nature differ. No doubt some of them have been malignant, judging from the sarcomatous degeneration of the connective tissue. In other cases, temporary relief, at least, is secured by extirpation.

It is clear that all the tumors of the second group have a common tendency—to produce implantations upon the peritoneum and intestines, seriously impairing the health and rendering further operation probable; to recur in the pedicle where their radical destruction is very difficult; to attack at the same time, or later, the other ovary. In sarcoma cases, if the second ovary appears healthy microscopically, in the young women it should be left, for it has not been proved absolutely that there is a tendency to spontaneous involvement of the second ovary. Certainly, if the second ovary is affected microscopically, although it appears healthy grossly and is allowed to remain, the tumor will soon return; but in all cases reported, where the second extirpated ovary was proved unhealthy by microscopic examination, the tumor returned and the patient died in spite of the operation.

It is self-evident that the second ovary must be thoroughly examined, and at the least gross indication of involvement, both the ovary and the uterus should be extirpated. The disposal of the second ovary depends upon the character of the growth. The papillomata and pseudomyxomata are malignant, and the danger of a similar affection of the second ovary is not so serious, providing it is recognized and operated upon at the right time. Resection of any of this group of tumors is absolutely unpermissible.

The Value and Limitations of Conservative Surgery of the Ovary. Polak¹ asks whether the remote results of conservative surgery on a diseased ovary warrant resection of such an organ. He notes that the removal of the ovary in a young woman has many unfortunate physical and psychical results, while the preservation of a part of one or both renders symptomatic cure uncertain, and a second operation may be required.

Conservatism preserves the ovarian function, and avoids an artificial menopause. The author reviews the records of 300 cases occurring in his own service, in which resection of the ovary was performed. Forty-one patients, or over 12 per cent. of the entire number operated upon by conservative methods since 1901, have required ablation of the remaining organ or the part of the resected ovary left at the first operation.

Twenty-six pregnancies have occurred in 240 women in whom it was possible for pregnancy to occur. One patient contributed three full pregnancies and two abortions. In all of the patients, except the 41 who returned for operation, an early menopause was averted, and 106, or more than one-third of the total number, are free from pelvic pain of any kind, menstrual or intermenstrual. In 12 the treated ovary is larger than it should be, but there have been no symptoms. In 81 women both ovaries were resected, whereas in 219, one ovary was entirely removed and the other one resected.

It is interesting to note that 17 of the 26 pregnancies followed ablation of one ovary, and the ovary producing the fertile ovum had been extensively resected.

He does not believe in attempting to resect an ovary when it is the seat of multiple microcystic degeneration. All of the operations were in childbearing women; one tube was removed in 119 cases; neither tube was removed in 121 cases, so that there were 240 women in whom a future pregnancy was possible. No attempt was made to resect the tube. Six of the ovaries which were resected were the seat of dermoids.

One case of papilloma of the ovary was overlooked clinically, and papillomatous disease of the ovary and of the peritoneum developed afterward. Seven large multilocular cysts, varying in size from an

¹ Journal of the American Medical Association, vol. liii, p. 1382.

orange to a child's head, were enucleated from their laminated walls, which were trimmed down and sewed over. No recurrence took place; the retained part underwent atrophy, menstruation continued normally, and one pregnancy occurred.

Forty-seven patients had cysts of the corpus luteum; 36 are free from pain of any sort; 4 have required further treatment; 2 have a small sclerotic and painful ovary; 5 complain of menstrual pain, but there is no physical change in the ovary. Two fibromata of the ovary were enucleated, but the patients have been lost sight of.

In the remaining 90 cases, out of 161 in which the resected portion of the ovary has been examined microscopically, the diseased structures belong to the class of multiple cystic ovaries presenting numberless small cysts. In 55 of these cases, one ovary was ablated, leaving a good one behind. Resection of the diseased ovary was done in 35 cases; but five complete cures were secured; 21 patients have returned for further surgery. Nine menstruate regularly, though the quantity has become scantier each year, and each period is attended with some degree of menstrual pain. Two pregnancies followed resection.

It would seem, therefore, that multiple cystic degeneration was least favorable to conservative procedures, while ovaries containing retention cysts, cysts of the corpus luteum, large monolocular cysts, fibroids and dermoids may be conserved by resection, with considerable hope for the patients' continued well-being.

Metastasis to the Lung from a Pseudomucinous Ovarian Cyst. Nicholson¹ reports a case of multiple metastases to the lung from a pseudomucinous cyst of the ovary. The patient was sixty years old. She had been suffering from retention of urine, obstinate constipation, some difficulty in breathing, edema of the feet and ankles. Four weeks before coming under observation, she had had a feeling of tightness and constriction in the abdomen, and had noticed that it was growing larger. She had had leucorrhea for some time. There was no pain in connection with the bladder or the bowels. During the next four weeks she lost weight. She died twenty days after admission. Upon postmortem examination, a cystic tumor of the left ovary and multiple metastases to the lung were found.

The metastases presented the same histological characteristics as the ovarian tumor.

Pick, in commenting upon this case, says that it was undoubtedly one of metastasis from the ovary, and declares that it raises a question as to whether a primary adenoma of the lung ever occurs, and throws some doubt on a case previously reported by Helly.

Lumbricoid Worm in an Ovarian Abscess. Fry² reports the finding of a lumbricoid worm within an ovarian abscess. From the examina-

¹ Zeit. f. Geburts. u. Gyn., 1909, Band lxiv, Heft 2, S. 252.

² Journal of the American Medical Association, 1909, vol. liii, p. 1028.

tion of his case, the author believes that the parasite did not pass from the intestine to the ovary, but that it migrated through the vagina, uterus, and tube, where it gained access to the ovary through a ruptured Graafian follicle.

Mammoth Dermoid Cysts. Liell¹ reports three dermoid cysts of the ovary of unusual size. They weighed 42, 39, and 32 pounds. All three were of the left ovary.

Urinary Excretion during Anesthesia. Bovée² has investigated the renal excretion during the administration of chloroform and ether in gynecological operations. In 16 cases ether was employed exclusively, and in 16 cases chloroform. In no instance was morphine, atropine, salt solution, or any other drug or stimulant used. Marked loss of blood did not occur. In several cases, gauze was left lightly packed in the pelvic cavity, with an end of it projecting outward through the vulva.

The urine was saved for a period of twenty-four hours preceding all preparation of the patient for operation, and subjected to the ordinary chemical and microscopic examination. After determining the desired information with regard to the preliminary specimen for twenty-four hours, a catheterized specimen was again examined on the morning of the operation.

When the anesthetic was about to be administered, the bladder was emptied with a catheter. A self-retaining catheter was placed in the bladder, and the latter was emptied at intervals of fifteen minutes during the operation. Each specimen was carefully examined as to quantity, amount of urea, blood, epithelium, pus, albumin, and tube casts.

In regard to chloroform, it is stated that the time which elapsed between the beginning of its administration and the start of the operation averaged seventeen and seven-tenths minutes. The quantity of urine excreted during that period averaged 8 c.c., varying from nothing in 3 cases to 44 c.c. In regard to ether, it is stated that the time which elapsed between the beginning of anesthesia and the start of the operation was eighteen and two-tenths minutes. The average excretion during this time was 13.3 c.c.

In the chloroform series, during the first fifteen minutes of the operation, the average excretion was 9.6 c.c., or 80 per cent. of the normal amount before anesthesia. For the second fifteen minutes, the average excretion was 30 per cent.; in the third fifteen minutes, 28 per cent.; in the fourth fifteen minutes, 23 per cent.; in the fifth fifteen minutes, 83 per cent.; and in the sixth fifteen minutes, 91 per cent. There was then, during the administration of chloroform to produce anesthesia,

¹ Journal of the American Medical Association, 1909, vol. li, p. 2217.

² American Journal of Obstetrics, June, 1909, p. 1004.

a marked decrease in the rapidity of urinary excretion, followed by a fifteen-minute rise and a forty-five-minute fall, after which the urine increased to nearly the normal amount.

Under the ether, during the first fifteen minutes, the average was 4.5 c.c.; during the second, 3.4 c.c.; during the third, 6.9 c.c.; during the fourth, 7.8 c.c.; during the fifth, 8.6 c.c.; and during the sixth, 5 c.c. There was, therefore, during the first fifteen minutes of the anesthesia a rise in the rate of excretion amounting to 13.5 per cent.; it then dropped to 34 per cent. of normal, and then rose gradually at the end of an hour and a half to nearly normal.

It is easy to see, therefore, that the rate of urinary excretion is markedly lessened under both anesthetics, and more so under chloroform than under ether. The excretion of urea was always lessened, the degree always being most marked at the end of an hour and a quarter of anesthesia. Ether produces a greater proportionate lessening of urea than of the urine.

Blood and albumin were practically always present in the first specimen of urine. This was regarded as due to the traumatism incident to the insertion of a rather large permanent catheter. Casts appearing during anesthesia were first noted at the end of thirty minutes. They were first of the hyaline variety and later of the granular. Upon the whole, the two anesthetics, when skilfully administered, have little effect on the production of casts and albumin in the urine, inducing it in some, stopping it in others, and in others either not producing it or not materially modifying such production.

It was noted that the Trendelenburg position had a distinct influence upon the excretion of urine under either form of anesthesia, and the author believes that this position causes a certain degree of arrest of renal function, remarking, however, that it would be interesting to know just what influence is exerted by such agents as gauze pads packed at the brim of the pelvis for the purpose of holding the intestines out of the way.

The Air of the Operating Room. Robb¹ made a series of experiments to determine what part the air of the operating room played in the infection of wounds. The factors taken into consideration were the cleanliness of the walls and of the floor of the room, and *whether an electric fan was or was not running*.

There were five series. In the first, the floor was washed with a 1 to 1000 bichloride solution; in the second, the floor was washed with a 1 to 20 carbolic acid solution; in the third, the floor was washed with plain water; in the fourth, there was no preparation of the floor; in the fifth, experiments were made in rooms other than the gynecological operating room, and there was no preparation of the floor. In each

¹ Transactions of the American Gynecological Society, 1909, p. 550.

series one set of plates was exposed while the fan was running, and another set when the fan was not running.

As the result of the experiments, he draws the following conclusions:

Floor. When other conditions are the same and a just comparison can be made, it appears that the presence of some antiseptic in the wash water used upon the floor makes a marked difference in the number of bacteria falling on the plates per minute (14.2 and 19.6 colonies per minute with no antiseptic, 0.65 to 4.08 per minute with some antiseptic on the floor).

Fan. Whether the fan makes any difference or not, it is hard to say. Comparison of some series goes to show that it does not, while comparison of other series tends to show that there is a perceptible difference.

Walls. The condition of the walls seems to make the greatest possible difference. This was discovered accidentally, for at first it had been overlooked. Ordinarily, the head nurse in the operating room takes great pains to have the portable enamelled furniture, the floor, and all other accessories in spotless condition, while the dust is allowed to gather on the walls for weeks. On examining one series, Robb was greatly surprised to find almost no colonies, and this in spite of the fact that the floor had been mopped up with only ordinary water and that the fan was running. On investigation, it was found that the housekeeper had had the walls of the room thoroughly scrubbed a few days previously. Further experiments showed that this was a most important factor, for even with the floor absolutely uncared for, and with a fan running, practically no colonies were obtained after the walls had been cleaned.

People in Room. Even with the dirty walls, and with no preparation of the floor, and with the fan running, practically no colonies fell on the plates when they were exposed in a room on Sunday, when no one was stirring around.

The finding of *B. pyocyaneus* in a room in which a case infected with this organism had been operated upon three weeks previously, is of interest. The series exposed in the uncared-for pathological laboratory should be noted. Here the moulds prevailed and there were not many bacteria, but *B. coli* was found. This was the only organism in the entire group which was pathogenic for the laboratory animals. In the summer season, when the windows are more or less open, the number of bacteria present seem to be more numerous than in the winter season, or when the windows are closed.

As a result of this bacteriological analysis of the air of the operating room (prepared in the way described, viz., the usual scrubbing and disinfection of all operative furniture), and from Robb's practical experience in a considerable number of abdominal and plastic operations, both on dogs and human beings, he believes that the electric

fan can be kept running during an operation without causing any bacterial infection of the wound. Further experiments, however, from this standpoint will be necessary before positive deductions can be drawn. Thus far, the work done seems only to emphasize what was known before, namely, that an aseptic technique is the necessity of paramount importance.

Local Anesthesia for Operations on the Cervix. Henrich¹ has had considerable success with local anesthesia in dilatation of the cervical canal and operations on the cervix. He says that the cervix is more sensitive to pain than the anterior wall of the vagina. The cervix is especially well supplied with nerves.

In order to prevent pain when the cervix is dilated in cases of curettement, the author has employed a 1 per cent. solution of beta-eucain, to which some salt solution and a little adrenalin is added. The formula is as follows:

Beta-eucain	0.10 part.
Sodium chloride	0.06 “
One per cent. adrenalin	0.80 “
Distilled water to make	10.00 “

The addition of the adrenalin has the object of lessening the poisoning properties of the eucain, by causing it to be absorbed very slowly. In this way the effect of the anesthetic is lengthened. One or two c.c. of this solution are sufficient to make the cervix almost entirely insensitive to pressure.

One injects the solution at four points with a hollow needle, which is stuck 1 to 1.5 cm. deep into the portio. Some pressure is exerted upon the piston as the needle is drawn out, this being done slowly. The needle may be inserted into the cervical tissue through the canal. Finally, a few drops are slowly injected into the cervical canal itself. After injecting, the operator must wait at least five minutes. At that time the vaginal cervix will be pale from the constriction of the vessels produced by the adrenalin. If one now dilates carefully, there is no pain, although there may be a sensation of pressure. Besides dilatation, previous to curettement, one may easily excise pieces of the cervix for microscopic examination. When employed for these small cutting operations, care should be taken to control any possible source of bleeding by sutures, as the action of the adrenalin might prevent hemorrhage at the time of operation. The use of the local anesthesia in the cervical tissue lessens the reflex contraction of the cervix.

Local Disinfection. Von Herff² relates that the principle of disinfection which he has followed for longer than a year endeavors to prevent unnecessary softening of the skin, so that the bacteria lying in its depths may not be disturbed.

¹ Zentral. f. Gyn., 1909, No. 15, p. 524.

² Deutsch. med. Wochen., 1909, No. 10, S. 425.

In the preparation of the operating field, his object is to *destroy only the surface germs*, but these he wishes to destroy absolutely. With this object in view, he has discarded the usual washing with brush, soap, and water. The day before the operation the patient takes a bath and is shaved. Directly before the operation, the field of operation, wherever it may be, is washed gently for four minutes with a 50 per cent. alcohol-acetone solution by the means of flannel cloths. Following this, pure acetone is used for a minute to take up the alcohol, and the skin is dried. Acetone is very effectual in removing fatty substances from the skin surface, and has a tendency to contract it. He prefers acetone to ether because it is cheaper and less inflammable.

He has compared his method during the past year with that in vogue between 1902 and 1908, *i. e.*, hot water and alcohol. It has been absolutely satisfactory in 175 laparotomies, and he firmly believes that in none of the cases has anything been missed by not using soap and water. Altogether, the plan has been tried in 300 abdominal and vaginal cases.

Improved Trendelenburg Position. Opitz¹ thinks he has found an improved way of placing patients in the Trendelenburg position. This is secured by a movable part of the operating table which is elevated beneath the patient's buttocks, thus raising the pelvis as far as desired, while the feet and the shoulders remain in contact with the table. He believes this possesses some advantages over the ordinary means of securing the Trendelenburg position.

Undetached Pads and Sponges in Abdominal Operations. Crossen² speaks of leaving a sponge in the peritoneal cavity as one of the most deplorable accidents of abdominal surgery. Its continued occurrence and the failure of the preventive methods in general use give him sufficient reason to call attention to a method which he has used with much satisfaction for the past two years.

He believes that sponges are lost in the peritoneal cavity much more frequently than is generally supposed. He has found 172 cases, and says that the reported instances are only a small proportion, for the accident is not given publicity unless there is some special reason. Furthermore, many cases are not even recognized, the patient dying supposedly of peritonitis. In one-fourth of the cases death has occurred. In his opinion, there is no scheme in general use at the present time which effectually prevents this error in surgery, and all of the plans now in vogue may fail when the operation is hurried, when the assistants are few or untrained, and when the operator is amidst unfamiliar surroundings.

Crossen's plan has for its underlying principle the elimination

¹ Zeit. f. Geburts. u. Gyn., 1909, Band lxiv, Heft 3, S. 498.

² American Journal of Obstetrics, January, 1909, p. 58.

of all detached pads and sponges. In their place he uses long strips of gauze prepared in such a way that it may be drawn out as required, a little at a time. No detached piece of gauze is ever placed in the abdominal cavity. Each piece introduced for sponging is simply part of a very long piece, the most of which is always outside the abdominal cavity. As his technique is now developed, he employs for an abdominal section four narrow strips for sponging and one wide strip for packing back the intestines.

Each *narrow strip* consists of a piece of gauze ten yards long and half a yard wide. This is folded lengthwise so as to make six thicknesses. The folded strip is approximately three inches wide and ten yards long, with raw edges turned in and the ends tacked with thread to keep it from unfolding. The bag for each narrow strip is five inches wide and ten inches deep; it is made preferably of extra heavy material and sewed in such a way that there is no chance for a raveling to be pulled out with the gauze.

Beginning with one end, the gauze strip is packed firmly, a little at a time, into the bag. When the end of the strip is introduced to the bottom of the bag, it is fastened there by stitching through and through, so that if by any possibility the whole strip should be packed into the abdomen, to check a sudden hemorrhage or for other reason, the end would still remain securely fastened outside. When all the strip has been packed into the bag, the top of the bag is closed by folding over, and a large safety-pin is attached to the bottom. This safety-pin is for use later to fasten the bag to the abdominal sheet. It should be large, so that it will be strong and easily handled. Four of these filled bags belong in each abdominal section set.

The *wide strip* consists of a piece of gauze five yards long and one yard wide. This is folded lengthwise to make four thicknesses. The folded strip is approximately nine inches wide and five yards long. The bag for the wide strip is ten inches by six inches and opens at the side instead of at the end. The end of the strip is then fastened securely in the bottom of the bag by stitching through and through, and the folded strip is placed in the bag in such a way that when pulled upon it will come out as a wide strip, a little at a time. The open side of the bag is closed and pinned with two safety-pins, which are used later for pinning the corners of the bag to the abdominal sheet.

One wide strip and four narrow strips constitute one set. The narrow strip is used for sponging, for walling off small areas, and for all purposes for which small pads and sponges are ordinarily used. The wide strip is used for packing back the intestines, walling off large areas, and all purposes for which large pads are generally used.

At the operation, the lower end of a bag containing a narrow strip is pinned to the sterile sheet a sufficient distance away to bring the mouth of the bag conveniently near the wound, but not in the way.

If desired, the upper end also may be pinned to the sheet. The gauze strip is used as a sponge by catching a small part of it with the fingers or with forceps and pulling it out of the bag as required and then sponging in the abdomen. After use, this part is dropped away from the wound and another small part is drawn out and used. The used part is not cut off, but simply dropped outside the operative field, and, as more and more of a strip is used, this soiled part falls off the table and out of the way. Thus the greater part of the strip is always outside the cavity, and hence none can be left there.

Usually two strips, one placed on each side at the beginning of the operation, are used in the course of an ordinary abdominal section. In cases where there is but little sponging, only one strip is needed. In very extensive operations, where an extra amount of sponging is required, three or four strips may be needed. In no case has Crossen found it necessary to use more gauze than that contained in one set, though he always has an extra set sterilized and ready for use. He has tried different lengths and widths of strips, and prefers the size here given. When ready to pack the intestines out of the operative field, the bag containing the wide strip is wrung out of hot saline solution, laid on the abdomen, two corners pinned to the abdominal sheet, and the wide strip is then drawn out as needed to push the intestines out of the way and wall off the involved area.

The author uses these gauze strips exclusively in all his abdominal section work, from the time the skin is incised until the peritoneal cavity is closed. At first he anticipated considerable tangling of the gauze strips about the forceps in the wound, but found that that could be easily avoided by always dropping the soiled portion of the strip *outside the field close to the bag*. This prevents the accumulation of loose folds about the wound, with which the instruments may become entangled.

He has used this method for two years in various kinds of abdominal cases, and feels justified in recommending it as safe, practical, and convenient. He says that the object of the method is not convenience, but safety. The method is practically automatic. In clearing the wound for suturing, every bit of gauze is necessarily removed from the abdominal cavity without a particle of attention on the part of anyone. The strip of gauze may get in the way of instruments; and the plan may seem somewhat awkward at first, but as one becomes accustomed to the method it is less troublesome.

When the bags become contaminated by pus, they must be changed; but this, as in using ordinary pads, often is not necessary until ready to clear the field for closing. The wound and surroundings are then cleansed, and fresh towels and bag are put in place for the final steps. He has investigated the cost of this method, and finds that it does not exceed that of the detached pads and sponges commonly employed.

When he operates in strange hospitals, the nurse is given a slip containing definite directions for preparing the strips and bags a day or two before the operation.

Postural Drainage for Appendix Cases. Ill,¹ in reviewing a study of 440 operations on the appendix, calls attention to the use of the right lateral semiprone or modified Sims' posture in all drainage cases. The quantity of fluid thus drained from the abdomen is often truly wonderful. There is also a better pulse, temperature, and general appearance than when using the former methods of drainage. This posture has the effect of making the opening in the peritoneum the lowest point in the peritoneal cavity, and thus to drain very completely. It will be easily understood that fluid will flow downward more readily than upward, even though an upward flow may be assisted by the positive pressure of the abdominal contents. The drain, whether it be of the cigarette or the open gauze variety, may be brought out through the upper end of the incision, where it is least likely to cause a hernia. Loin incisions for purposes of drainage are thus rendered superfluous.

The posture may be described as follows: The bed selected should have a good mattress and a stiff spring. When such a spring cannot be obtained, a lap board should be placed under the mattress midway of the bed. In putting the patient into the bed, he is placed flat on his back well beyond the middle of the mattress. The left thigh is flexed at right angles to the body and the bent right elbow pushed alongside of the chest, to remain either behind or in front of the patient, as may be most comfortable. The patient is then rolled over on his right side until the wound is flat on the bed, the left thigh remaining at a right angle to the body. A very small pillow under the right side of the head will add to the comfort of the patient. It is quite important that the bed be an unyielding one.

There is little complaint from the patient because of the posture. At the end of twenty-four hours, that is, with the change of the first dressing, the patient is turned on his back, for at the end of that time everything is walled off. As has already been said, the amount of fluid drained off during the first twenty-four hours is often amazingly large. A further advantage of the posture is the ease with which normal saline solutions may be injected into the rectum. The introduction of the fluid is much favored by this posture, since it will naturally gravitate upward.

The wound should be kept scrupulously clean. Whenever the gauze is used, either *en masse* or as a cigarette drain, it is good to have it kept wet. Wet gauze will continue to act as a drain, while dry gauze will dam up the discharge. It is, therefore, Ill's custom to place a compress soaked in a 1 per cent. solution of carbolic acid over the wound, and

¹ American Journal of Obstetrics, November, 1909, p. 863.

over the compress a piece of rubber tissue, which keeps the compress from drying.

The nurse changes the compress as often as it is necessary to keep the parts clean, that is, about once in four hours. When the drain has once been removed, no further packing is ever done. Constant packing of the wound is not only exceedingly annoying and painful to the patient, but lengthens the period of convalescence and keeps up a running temperature. The author has many times heard his assistants say that his own ward patients recover more quickly and easily than those of his colleagues who insist upon repacking the wound.

New Technique of Vaginal Hysterectomy. Bandler¹ describes what he calls a new method of vaginal hysterectomy for the treatment of fibrosis uteri. A transverse incision is first made upon the posterior aspect of the cervix through the vaginal mucosa about an inch above the external os. The cul-de-sac of Douglas is opened and the peritoneum is brought down at either lateral margin of the incision and clamped to the edge of the vaginal mucosa. An anterior incision is made, which almost, but not quite, joins the end of the posterior incision. The bladder is separated from the cervix and from the vaginal wall, after making a longitudinal incision through the latter which joins the anterior transverse incision.

A ligature is passed on either side through the lower border of the broad ligament close to the uterus and tied very firmly over the uncut lateral border of the vaginal mucosa. The uterine artery is tied by a second silk ligature, one inch above the first one. The structures between the two are divided toward the cervix. The anterior pouch of the peritoneum is opened and the fundus of the uterus is grasped and drawn out with the tubes and ovaries.

Three silk sutures are then applied on either side to solidly ligate the broad ligament; the first one near the fundus, including about one-third of the width of the broad ligament, the second, external to this and taking in two-thirds of the width of the broad ligament, and the third one external to this, taking in the entire broad ligament. When this has been done, the uterus is cut off and removed, the scissors passing close to the uterine structure. The upper part of the broad ligament, including the outer half of the tube, the ligament of the ovary, and the ovarian arteries form a thick compact band held on either side by the three silk sutures.

Any small bleeding points are caught and tied, and the operation is practically completed. The intestines are pushed out of the way by gauze, and then, by appropriate suturing, the entire thick upper portion of the broad ligament is attached closely to the lateral vaginal wall and is held outside of the peritoneal cavity. The author reports 110 cases without a death.

¹ American Journal of Surgery, March, 1909, p. 99.

Large Hernias of the Linea Alba. Henkel¹ describes his procedure in operating upon large hernias of the linea alba. He first makes a transverse incision through the skin and subcutaneous fat, exposing the fascia in front of the rectus muscle. He then locates the inner border of each rectus muscle, and opens the sheath of the rectus on each side by a vertical incision about 1 cm. within the mesial border of the rectus. The inner borders of the sheath thus freed are sewed together in the median line, then the inner borders of the rectus muscles, and then over this the external fascia. The operation gives a firm muscular support, and does not involve the peritoneal cavity.

Resection of Excessive Fat from the Abdominal Wall. Weinhold,² for some time when operating upon women with very fat and pendulous abdominal walls after completing the intra-abdominal part of the operation, has carried out a plastic procedure to relieve them of excessive tissue, and restore the configuration of the abdomen to the normal.

He distinguishes three forms of abdominal walls—the emaciated relaxed, the fatty tight, the fatty relaxed. After closing the peritoneum, the fascia of the rectus muscles is split and the recti muscles are sewed together in the median line by continuous catgut sutures, the fascia is united broadly by silkworm-gut sutures, and then as much of the subcutaneous fat and skin is cut away as is necessary to reduce the enlargement.

In discussing the paper, Fraenkel³ thought that the indication for this procedure was purely cosmetic. He said that it was too extensive to employ in connection with any serious abdominal operation, and that he did not believe it would have any great effect on the symptoms of enteroptosis or diastasis, unless there was resection of the fascia of the abdominal wall, as well as of the skin and subcutaneous tissues.

Observation on Watkins' Operation. Lichtenstein⁴ has studied two cases in which a fatality followed the Wertheim-Watkins-Schauta operation for cystocele. The first from a complicating carcinoma of the thyroid, the second from pulmonary embolism. As a result of his study, he believes that a number of the recurrences of cystocele following operation are due to the fact that the hemostasis of the operating field has been imperfect, and that hematoma have formed which are predisposing to a recurrence of the cystocele. He directs that great attention should be paid to very careful hemostasis during this operation. The separation of the bladder from the cervix and anterior vaginal wall should be made through the layers of loose connective tissue, for in this manner the injury to the bloodvessels is in part avoided.

¹ Archiv f. Gyn., 1909, Band lxxxviii, Heft 3, S. 457.

² Zentral. f. Gyn., 1909, No. 38, p. 1332.

³ Ibid., p. 1344.

⁴ Archiv f. Gyn., 1909, Band lxxxviii, Heft 2.

Frankenthal¹ describes an operation which he has used for the cure of prolapse of the uterus. It is an operation very like the one used by Watkins. He makes a special point of sewing the vesical peritoneum to the posterior wall of the uterus; otherwise, the operation appears to be the same as that described by Watkins. This attachment is made as low as possible on the posterior wall of the uterus near the internal os, and it is made immediately after delivering the uterus. Thus the peritoneal cavity does not remain open for more than a few seconds, and no blood and no raw surfaces come in contact with it. This attachment of the peritoneum serves to hold the uterus in an exaggerated anteflexed position.

Submucous Perineorrhaphy. Babcock² has described a method of submucous perineorrhaphy which is based upon six years' experience. He says that perineorrhaphy operations, as a rule, consist of little more than the removal of an area of mucous membrane and the bringing together of the edges of the wound by sutures. He criticises the Emmet operation because in it the crest of the rectocele is brought close to the posterior edge of the vaginal opening, whereas normally it occupies a position some distance above the introitus. The operation, therefore, shortens the posterior vaginal wall. The lateral triangular denudations obliterate the normal lateral sulci, so that after the Emmet operation the vagina loses the normal H-shaped section and becomes less dilatable. Few operators carefully investigate the muscular structures in doing an Emmet operation, and fewer make an exposure of the muscle or use an accurate method for the muscular restoration.

The operation that Babcock uses is founded on the following principles: (1) No tissue is removed or extensive denudation made. (2) Buried absorbable, layer sutures are used exclusively, none of which penetrate the skin or the mucous membrane. (3) The operation is done from the outside of the vagina, rendering the introduction of sutures easier and the exposure of tissues better than with those operations done from within the vagina. (4) Each structure is sutured with precision under the guidance of the eye; there is no blind groping with the needle for tissues not seen and perhaps not felt. (5) Each of the layers of the perineal floor—vaginal wall, submucosa, muscular supports, fascial planes, and skin—are united seriatim in layers after the plan of the better types of herniotomy. (6) The vagina is not separated from the rectum, and, therefore, there is no danger of wounding the bowel.

He says the operation has the following advantages: It increases, instead of shortens, the length of the posterior vaginal wall. It pro-

¹ Journal of the American Medical Association, vol. liii, 1909, p. 16.

² Ibid., 1909, vol. lii, p. 1568.

duces great narrowing of the external portion of the vagina, and affords great support to the anterior vaginal wall. It restores the normal H-shaped section instead of obliterating the sulci. No sutures require removal, no foreign bodies are left in the vagina, the resulting perineum is more elastic and resilient than when through-and-through sutures are used. He describes the operation as follows:

The labia having been separated and supported by the fingers of an assistant, the sharp point of a pair of scissors is introduced into the subcutaneous cellular tissue just external to the orifice of Bartholin's gland. The incision is carried around the posterior margin of the introitus just external to the carunculæ until a point external to the orifice of the opposite Bartholin's gland is reached. A pair of tenaculum forceps is then fastened to the outer edge of the posterior part of the incision to serve as a retractor. No separation of the vagina from the rectum is necessary except when the tissues about the posterior commissure are so cicatricial that the usual gaping of 2 cm. or 3 cm. of the wound edges is not obtained. If the posterior wall of the vagina is bound down and deformed by cicatricial tissue, this should be loosened sufficiently to overcome the deformity.

The second step consists in the exposure of the levator ani. The edge of the muscle is located between one finger placed against the lateral wall of the vagina, and a second finger or thumb placed in one side of the wound. Having located the muscle in the wound, a pair of sharp-pointed scissors is thrust through the depths of the wound to the situation of the anterior edge of muscle, then opened and withdrawn. This penetrates the remains of the fascia of Colles, the two layers of the triangular ligament, and perhaps the thin and at times almost inconspicuous layer of the transversus perinei profundus, which lies between. The opening is enlarged by stretching with the fingers, or, if necessary, by a few touches of the knife, and the finger is passed into the opening close to the lateral vaginal wall until the edge of the levator ani is felt. The muscle is freed on its inner and outer sides by the finger, grasped with a pair of tenaculum forceps and pulled into the wound. On the side of greater laceration the muscle will usually be found to have the deepest situation. The isolation and exposure of the muscle is usually easy and requires but a few seconds of time. Very rarely will the muscle be found to be completely divided. The opposite edge of the levator ani is then exposed and brought into the wound in the same manner.

The third step of the operation consists in the repair of the vaginal mucous membrane. With a curved needle and No. 1 plain catgut, the mucous membrane is united, beginning near what was the posterior commissure. A continuous suture is used, engaging the submucous cellular tissue a short distance from the wound edges and uniting the upper border of what was a transverse incision in a vertical manner.

In doing this, the part of the vagina that was near the posterior commissure is made to occupy a position several centimeters above the introitus, and the length of the vagina is restored. If there is much redundancy, a second row of sutures may be applied, catching the tissue outside number one and so rolling the submucous tissues together that the convexity on the mucous surface of the posterior wall of the vagina is markedly increased. Suture number one, which has thus made a partial submucous closure of the vaginal wall, is then temporarily laid to one side to be finished later.

The fourth step of the operation consists in uniting in the median line the edges of the levator ani muscle, which are located by the attached tenaculum forceps. Interrupted, continuous, or mattress sutures of chromic catgut may be employed, but the muscle must not be united so far anteriorly as to unduly constrict the orifice. Some of these sutures catch the underlying submucous tissue to prevent the formation of a dead space. Posteriorly, a simple or figure-of-eight suture is employed to bind together the various structures that meet here, and, if necessary, to give support to the sphincter ani. In certain cases, it may be desirable to reinforce the sphincter ani by splitting off strips from the anterior edges of the levator ani, wrapping these about the sphincter and fixing them in place by sutures. Rarely is a similar procedure desirable anteriorly to reinforce the vaginal support. Should the sphincter ani be found to be torn, which is not usual, the divided ends should be pulled well forward, carefully isolated, and repaired by buried sutures. With the union of the levator ani muscles, the rectum, anus, and vagina will be found to ascend to a higher position in the pelvis, and to be carried forward toward the pubis.

The fifth step of the operation consists in the suturing of the inferior fascial plane to reinforce the muscular support. The outer edges of the incision, through which the levator ani muscles have been brought, are united in the median line by continuous, interrupted, mattress, or imbricating sutures of No. 1 chromic catgut, as may seem necessary in the particular case. This support, which includes the posterior part of the urogenital trigone, affects the layers of the triangular ligament and the deep transversus perinei muscle, and posteriorly serves to increase the tension on the transversus perinei muscle. To obliterate any dead space, some of the sutures may catch the underlying muscle.

The sixth and final step of the operation consists in completing suture number one, which, after securing the submucous union of the vagina, is continued posteriorly under the skin, uniting the subcutaneous and Colles fascia until the posterior portion of the incision is reached. The two ends of suture number one are then tied, binding together the various structures that have been united; the knot is permitted to sink under the skin, the ends being cut short.

New Operation for Prolapsus Uteri. Polk¹ reports a new form of operation for prolapsus uteri. In an extreme case, the patient is kept in bed for a week or ten days previous to the operation, in order to reduce the prolapse and to permit the affected viscera and surrounding structures to regain as much of the normal status as possible.

After a median incision in the Trendelenburg position, the uterus is pulled up with a double tenaculum, and a longitudinal antero-posterior cut is made through the peritoneum of the vesico-uterine pouch. This opening is stretched laterally and the bladder is separated from the anterior wall of the vagina as far as the trigone, or even beyond it. The ureters are pushed aside. The antero lateral lines of the vagina, one on each side, are sutured from below, upward, beginning as low down as possible, and ending just below the upper end of the peritoneal incision. The latter is closed by a second line of sutures. The uterosacral ligaments are now shortened, stitching them at the junction of the inner with the middle third to the uterus at one side of their normal attachment, and taking up as much of the slack as is necessary to restore their original supporting function.

The disposition of the uterus varies. If it is to be retained and it is not senile, the round ligaments may be shortened. If it is senile, Polk suggests that it be thrown upward and the fundus held in the sulcus behind the bladder by a retaining suture through the round ligament at each cornua. If the uterus is removed, the first part of the operation is executed, as already described, as far as the suture of the peritoneal incision in front of the uterus. At this point the organ is amputated at about the level of the internal os, care being taken to stop short of the attachment of the uterosacral ligaments. The cut surfaces of the stump are stitched together in continuation of the line of the original incision; the loose ends of the severed broad and round ligaments are included in this line of suturing. And finally, the uterosacral ligaments are caught up at their junction with the stump; the right is drawn over and stitched to the stump on the left, and the left is drawn to overlap the right and stitched in a corresponding position on the right.

New Operation for Cystocele. White² asserts that the only problem still unsolved by the gynecologist is the permanent cure of cystocele. He thinks that cystoceles recur after operation because the normal support of the bladder has not been restored. Instead, there has been an irrational removal of part of the anterior vaginal wall. The bladder is attached to the symphysis pubis and pubic bones in front, laterally to the white line of the pelvic fascia, and the ischiatic spine, and above and behind to the uterus. The real support comes from

¹ Transactions of the American Gynecological Society, 1909, p. 144.

² Journal of the American Medical Association, 1909, vol. liii, p. 1707.

the white line, and the author believes that cystocele is caused by a breaking loose of the vagina from the white line. This may readily occur during labor, especially an instrumental delivery.

The author has devised an operation for reattaching the vagina to the white line, especially at its origin from the ischiatic spine a procedure which he says can be done through the vagina without great difficulty.

His technique is described as follows:

The vagina is held open by two retractors, the ischiatic spine is located by palpation, and an incision from one to two inches long is made through the mucous membrane, parallel to the white line, and extending well up the vagina. The bladder is separated from the vagina by blunt dissection, until the spine of the ischium and the white line are reached and can be felt uncovered beneath the finger. Hemorrhage is seldom troublesome and can be controlled by a few minutes' pressure. The sutures, which are of chromicized catgut, are passed under guidance of the finger by a Deschamps handle-needle.

The first suture goes back of the white line just as it joins the spine of the ischium. The handle-needle is taken off, and each end of the suture threaded on a separate needle; one needle is passed from within out through the median edge of the incision, taking a firm hold on the vagina; the other needle is passed in a similar manner through the lateral edge of the incision. The two ends are then clamped and are ready to be tied. A similar suture is placed half an inch lower down on the white line, and when this is in place both sutures are tied, bringing the lateral sulcus of the vagina in contact with the white line of the pelvic fascia.

Should there be any prolapse at the outlet of the vagina, the incision may be extended down alongside of the urethra, and the vagina sutured to the dense fascia covering the pelvic bone. The opposite side is treated in a similar manner, and when both sides are tied the anterior vaginal wall is drawn up in a normal position, and has no tendency to sag, even when the patient coughs or strains. The vagina reaches across from one ischiatic spine to the other, without any tension; it collapses when the retractors are removed and the normal relations of the parts are restored.

The operation is always done in combination with other plastic operations, and does not interfere in any way with them, nor does it minimize the caliber of the vagina, which is a matter of importance should extensive denudations be contemplated for a rectocele.

The Symptoms Which Arise from Visceral Adhesions of Various Types. Clark,¹ in considering visceral adhesions, divides them into post-operative and postperitonitic, and into localized and general varieties.

Localized adhesions are more likely to follow operation, whereas general ones are produced by general peritonitis. *General adhesions*,

¹ Transactions of the American Gynecological Society, 1909, p. 401.

if the patient survives, are likely to give less symptoms than localized ones, because there is less danger of constriction and strangulation.

In the consideration of such lesions, it is essential to keep in mind the movable points of the gastrointestinal tract, for these are more likely to be affected than the normally fixed ones. The vulnerable parts of the large intestine are the cecum, the transverse colon, and the sigmoid flexure; of the small intestine, the pylorus, the beginning of the jejunum, the ileum at its junction with the cecum, and the loop of the ileum which drops into the pelvis.

The omentum should be considered alone, for very far-reaching results are likely to arise from its faulty fixation to the underlying viscera or to the anterior abdominal wall. Any direct tugging or fixation of the omentum acts first upon the transverse colon and then upon the stomach. The movable portions will be pulled downward and the fixed portions are likely to be kinked. The most likely sequelæ of omental adhesions are disturbances of digestion, referred first to the colon, and second to the stomach. Tympanites and constipation without gastric involvement are the dominant symptoms when the traction acts more directly upon the colon. When the stomach is also involved, there are manifestations that it must act against an obstruction, and these consist of eructations of gas and sour fluid, a full sensation or even distress after eating, and, in the more chronic cases, symptoms of gastric dilatation.

The two chief vulnerable points of the small intestine are the pelvic portion of the ileum from its dependent loop to its junction with the colon, and the duodenojejunal junction. As the pelvic and appendicular areas are especially liable to infection, the ileum very commonly is affected, both by local and by general adhesions. On the contrary, the jejunal fossa is only apt to be involved in the event of a general peritonitis. During the latter, the patient usually occupies a recumbent posture, and purulent fluids accumulate in the loins through gravity and the natural tendency for all fluids to be swept toward the diaphragm. This fact is the strong argument in favor of the Fowler posture in peritonitis. In the gastric disturbances following extensive peritonitis, therefore, not only should the pylorus itself be considered as a point of possible obstruction, but the duodenojejunal junction always should be carefully inspected.

Localized adhesions along the course of the small intestines are much more likely to produce symptoms than general adhesions. The small intestine is disposed in well-defined systems without any acute angles in its course. Unless, therefore, adhesions are so distributed as to produce angulation, symptoms are not likely to arise. This is constantly noted in surgery. When the abdomen is opened some time after general peritonitis, one may find widespread adhesions, and yet few or no intestinal symptoms have been noticed. This is due

to the fact that the intestines have continued to occupy their general parallel lines, that the contents of the small intestine are fluid, and that the peristaltic wave is propagated by the concentric ring-like action of the circular muscles. A fluid mass, therefore, is propelled with much greater ease, and without symptoms, even through adherent coils of intestine, than is possible with the inspissated mass that is found in the large intestine.

On the other hand, a knuckle of bowel adherent in the pelvis, or to the anterior abdominal wall and producing an acute angle in the intestinal course, may give rise to the most exaggerated and fatal symptoms. Hence the statement that localized adhesions are more serious than general adhesions in their immediate and ultimate effects.

For several years the author has been in the habit of giving an enema of from one and one-half to two liters of salt solution at the completion of every abdominal operation, while the patient was still under the anesthetic and in the Trendelenburg position, unless there was some lesion or operation upon the bowel contraindicating it. Through many observations he has found that not only is the entire colon partially filled, but that the fluid frequently backs out in a serpentine wave through the ileocecal valve into the ileum. In this way the transverse colon is naturally dropped back into its normal situation by the weight of the fluid, and the sigmoid flexure is untwisted and restored to its natural situation if it has happened to occupy a bad position in the pelvis through the distortion of packs or operative manipulation. This practice not only acts as a stimulant, but relieves thirst, assists the action of the kidneys and bowel, and reduces the frequency of postoperative adhesions.

It is the author's belief that in many instances not only tympanites, but ultimate difficulties in the digestive tract arise more from improper disposal of the viscera during or at the completion of an operation than from the usually assigned causes. The author has been so impressed by the exaggerated disturbances of digestion due to omental adhesions, that he no longer makes strenuous attempts to envelop operative areas with this membrane. If the omentum is long and dependent, it may be used for this purpose without any traction upon the colon, in order to avail one's self of the protective action of the peritoneum, but otherwise the policy is unquestionably bad, and the ultimate vicious effects of this fixation far outweigh the possible immediate protection of the patient against peritoneal involvement.

How to Prevent Adhesions after Abdominal Operations. Webster¹ gives a number of suggestions for the prevention of adhesions following certain operations in abdominal surgery. In the lower animals, adhesions may be produced by undue exposure to dry air, cold air, mechanical trauma, and the cultures of microorganisms.

¹ Transactions of the American Gynecological Society, 1909, p. 407.

These factors must be avoided when operating on human subjects. The most suitable atmosphere for the operating room is one charged with moisture at a temperature of 93° F. This condition is practically never found, for it would tax an operator and his assistants almost to the point of endurance. The defects in atmospheric conditions may be minimized to a great extent by avoiding unnecessary exposure of viscera, and protecting everything, save the immediate area of operation, with gauze pads soaked in a hot normal saline solution. To reduce trauma, sponging should be employed as little as possible. All manipulations and the use of retractors should be carried out with great gentleness.

Raw areas should not be left exposed when it is possible to bury them. Small raw areas on the parietal peritoneum, omentum, bladder, broad ligaments, mesenteries, etc., may usually be easily covered with adjacent peritoneum. Extensive raw areas of omentum or adherent epiploicæ appendages should be removed, and the stumps suitably buried. Small raw areas of the intestine may be buried by fine catgut sutures passed in the direction of the long axis of the bowel. Large areas may be covered by omental grafts. Raw areas of the ileum adjacent to the cecum may be satisfactorily covered by suturing the ileum to the movable cecum, after removal of the appendix in such a manner as not to constrict the lumen.

Denuded areas on the anterior surface of the pyloric end of the stomach and the first part of the duodenum, may be covered by turning up the great omentum and suturing it with fine catgut to the affected parts. When a large area of ileum is raw and bleeding, or the wall is dangerously thin, resection should be adopted. Small tags of separated adhesions or small raw areas which cannot be covered with peritoneum or with omental grafts should be charred, because such a surface is less likely to become adherent than a raw, oozing one. A thick char dare not be made on the intestine.

After bilateral removal of pelvic tumors, or infected tubes and ovaries when extensive separation of adhesions must be carried out, the intestines may descend into the pelvic cavity afterward with a consequent development of adhesions. The author, to avoid this complication, practises the following plan:

The uterus is removed, its anterior peritoneal layer being left continuous with the broad ligaments. Bleeding points are secured and a strip of gauze is passed into the vagina, its upper end resting in the pelvis just above the opening in the fornix. The broad ligaments, with the intervening uterine peritoneum forming a flap across the pelvis, are turned backward and stitched to the parietes and rectum, so as to form a new covering on the pelvic floor.

When the raw area is very extensive, Webster stitches the utero-ligamentous flap to the upper part of the rectum and its mesentery,

as it lies naturally in an oblique direction across the pelvis. In this way the pelvic cavity may often be left without a single raw area. The plan is of the greatest value when the pelvis is infected or when the lower part of the rectum has been left in an injured condition, so that there is doubt as to what may happen to it. Vaginal drainage may be kept up without any risk of contaminating the general peritoneal cavity. The latter may be independently drained, if thought advisable. The rectum is not interfered with by this method. He has not had any trouble in several hundred cases.

Very rarely the rectum and the peritoneal flaps cannot be so disposed as to cover the pelvis completely. A gap may then be left in the right posterior half of the pelvic brim, and the cecum, if movable, may be used (after removal of the appendix) to complete the deficiency, being attached by a few stitches to the rectum and the parietal peritoneum. The result is very satisfactory.

Gellhorn¹ has carried out a series of experiments to determine whether the application of *lanolin* to raw surfaces will prevent the formation of adhesions in the peritoneal cavity. He says that the use of normal salt solution for this purpose has not met with universal favor, some authors even believing that salt solution predisposes to adhesions.

His experiments with lanolin were made upon rabbits and dogs. He opened the abdomen, made rather extensive denudations of the gastric and parietal peritoneum, covered the raw surfaces with lanolin, and closed the incisions. Control experiments were made at the same time. The results were generally favorable, quite different from those reported by Busch and Biebergeil, who considered lanolin not only incapable of preventing adhesions, but even of causing them.

The employment of *absorbable membranes of animal origin* is not entirely satisfactory, for they are applicable only to raw surfaces of the parietal peritoneum or to large stationary organs. They cannot be used, for example, to cover multiple raw areas upon the small intestine.

Non-absorbable membranes, like *collodion* and an *aristol film*, have answered their purpose in the experience of certain surgeons, but it is impossible to apply collodion to a moist surface.

The formation of a *dry eschar by thermocauterization* is effectual only when there has been an intense charring of the tissues, and this degree is impracticable upon the intestine. In milder degrees it produces adhesions.

Thiosinamin, and its combination with salicylate of sodium, the so-called *fibrolysin*, are supposed to have a softening influence upon cicatrices and other abnormal formations of the connective tissue. Both preparations have been tried by hypodermic injection in pre-existing adhesions of the peritoneum. While a number of authors have had good results, others report only failures.

¹ Transactions of the American Gynecological Society, 1909, p. 15.

The use of *physostigmine* to promote active peristalsis, and thus prevent primary adhesions, has been advocated. Although Vogel and Craig report highly encouraging results, Busch and Biebergel believe that even in large dose it cannot prevent the formation of adhesions, and warn against too active peristalsis following operations upon the stomach and intestines.

In order to prevent the first step in the formation of an adhesion, viz., the exudation of serum which coagulates and forms fibrin, Hertzler used *phosphorus* by the mouth because it destroys the fibrinogen and in this way prevents coagulation, and *peptone*, hypodermically, because it neutralizes the fibrin ferment in the blood. In a preliminary report, the author speaks of absolute success with the phosphorus. With a more or less similar purpose, Marvel suggested *adrenalin*, and Strassmann, *liquor aluminii acetici*.

The use of non-irritating *fats* and *mucoid substances* have this advantage, that when poured into the abdominal cavity they overspread peritoneal surfaces with an even coating, and thus cover all abraded surfaces automatically. For this purpose *sterile olive oil* has been used, but by a number of authors it has been found that it does not prevent adhesions; furthermore, it is slowly absorbed, and may irritate the peritoneum.

Paraffin has been tried, but it is difficult to make it adhere to a moist serous surface. Absorbable liquid paraffin causes an intense irritation of the peritoneum and increased formation of adhesions, while solid paraffin at a melting point which corresponds to the body temperature is not absorbed and acts as a foreign body. *Solutions of agar and of gelatin* irritate the peritoneum and do not prevent adhesions. *Mutton tallow* becomes solid at body temperature and is not absorbable. It also is difficult to apply to moist serous surfaces.

Vogel has had especially good results with a thick *solution of acacia*. He made a mucilage of acacia in normal salt solution, and concluded that the combination of hypodermic injections of *physostigmine* and topical applications of his mucilage always prevents the reformation of adhesions, at least in rabbits. No observations have been made of its use in the human body.

The Meaning of Peritoneal Adhesions. Byford¹ speaks of the significance of peritoneal adhesions following operation. Adhesions are first of all protective. They impede or prevent the perforation of gastric or intestinal ulcers, or direct the ulceration into an adherent loop of intestine or into a circumscribed space. Similarly they protect the general peritoneal cavity from invasion by visceral and intervisceral abscesses. They also exclude or minimize the absorption of germs and their toxins into the system.

¹ Transactions of the American Gynecological Society, 1909, p. 396.

Their influence, however, is not altogether for good, since they are apt to persist after having accomplished their purpose, and interfere with visceral function. In fact, it often becomes necessary to operate for their relief.

It is quite common for a patient to be subjected to a second operation for the release of adhesions which are the result of a primary one unskillfully performed. Adhesions of limited extent between the intestines and denuded stumps, or imperfectly closed incisions, cause attacks of distention, impaired digestion, and even obstruction. Sometimes patients who complain of these symptoms may be cured in time without a second operation, by horseback riding upon a rather roughly gaited horse, or by simple exercises. For these reasons the author makes a routine practice of giving laxatives early after abdominal section, in order to prevent the formation of adhesions, or to break them up before they become firm, or at least to limit their extent.

The author has seen cases in which gastric symptoms were due entirely to adhesions of the omentum which dragged the stomach downward. He therefore deprecates the practice of drawing down the omentum to cover raw surfaces in the pelvis. He tries to irritate the peritoneum of the intestines and the abdominal walls as little as possible, by using small incisions and by doing as much of the deep work as possible by the aid of touch, and as much as possible at the surface without introducing sponges or packs into the abdominal cavity.

This technique is practically applicable to adnexal and to appendicular work during the quiescent stage. The parts to be removed are drawn to the surface and surrounded by approximating the edges of the peritoneal incision about them, or by using a piece of gauze or rubber dam. After the parts have been returned to the abdominal cavity, a fenestrated glass tube is passed down to the posterior cul-de-sac and the blood is sucked out by means of a small rubber tube attached to a glass syringe. It is, of course, sometimes necessary to make a large incision and pack the intestines out of the way. In such cases, by using the Trendelenburg position, he makes an effort to have the intestines sink out of the field of operation and assume their own position. A firm immovable barrier of gauze can then be placed against them with almost no manipulation or relative displacement.

The Influence of the Gall-bladder on Postoperative Nausea and Vomiting. Wylie,¹ in a discussion, said that not enough care is taken in emptying the intestinal tract before operation. He finds, by routinely examining the gall-bladder for gallstones, that whenever the gall-bladder is tightly distended with bile, almost without exception, there is serious vomiting. He believes that if the intestinal tract and the gall-bladder are really emptied before operation, the after-effects of ether with respect to the

¹ Transactions of the American Gynecological Society, 1909, p. 309.

stomach and intestines will be materially lessened. His preparatory treatment of important cases requires at least a week, and is as follows:

The intestinal tract is emptied with laxatives, such as compound licorice powder; then a mixture of 1 dram each of glycerin, fresh castor oil, spiced syrup of rhubarb, and enough quinine to give a bitter taste, is administered an hour before lunch, dinner, and at bedtime. By giving this for a few days in all cases, and, in bad cases, for at least a week before operation, the patient is seldom sick after ether. It causes hypersecretion along the intestinal tract, more or less nausea, and perhaps vomiting. If the gall-bladder is full, there is a temporary diarrhea. If the mixture is continued, in a day or two the disagreeable symptoms disappear, and the intestinal tract inside of a week is in good condition. While taking the mixture, laxatives can be given if required.

Peroneal Neuritis and Paralysis. Peterson¹ reports a case of thrombophlebitis with peroneal neuritis and paralysis following supravaginal hysterectomy.

A patient, aged forty-nine years, was operated upon for a multinodular fibroid tumor which was partly intraligamentous. The convalescence was uninterrupted for three weeks. On the twenty-fifth day, there was a sudden rise of temperature without pain or tenderness. Two days later, when the evening temperature reached 103, marked tenderness developed over the left femoral just below Poupart's ligament. The leg was not much swollen. There was excessive pain in the leg from the knee to the end of the toes. It continued for ten days. Four days later it was possible to bend the leg slightly at the knee, although it was still impossible to manipulate the foot and toes to any extent. After a few days more a distinct foot-drop and lack of sensation in certain areas of the left leg and foot were found.

The author believes that the peroneal palsy in his case was produced by the pressure of a thrombotic left internal iliac vein upon the left lumbosacral cord. This pressure was sufficient to produce a neuritis, and later on, a paralysis. Such an extensive thrombosis must be rare after operation, or else peroneal paralysis would more frequently follow the thrombophlebitis. Such a palsy is too striking and too long continued to fail of recognition, and would surely have been recorded were it common in postoperative thrombophlebitis.

Early Rising after Operation. Hofmeier² is not inclined to believe that allowing patients to get up early after gynecological operations, or labor, has anything to do with the reduction in frequency of thrombosis.

He bases his opinion upon 289 operations for fibroid tumor. In this number there were six cases of thrombosis. It occurred three times after supravaginal or total abdominal hysterectomy, twice after

¹ Transactions of the American Gynecological Society, 1909, p. 498.

² Zentral. f. Gyn., 1909, No. 1, p. 21.

vaginal hysterectomy, and once after castration. Three of the patients died; one from tetanus, one from peritonitis, and one from pulmonary embolism. In the first two the thrombosis was unexpectedly found at autopsy. There had been no clinical symptoms. He thinks the diminution in the number of cases recently is not the result of any change in after-treatment, but the natural sequel of greater technical skill or more rigid asepsis, and the use of spinal anesthesia. In 10,000 cases of labor, there were 12 cases of thrombosis without any deaths.

Frömme¹ does not believe that there is any advantage in letting patients get up early after labor. He has investigated the question in a hundred cases, but did not see any difference in favor of those which were allowed to get up early; in fact, he reports one case in which early rising from bed may have hastened the occurrence of thrombosis.

Intestinal Obstruction. Wathen² says that intestinal obstruction may be partial or complete, and primarily paralytic or mechanical.

The *primary paralytic* form may be caused (1) by violent inhibitory impulses transmitted to the muscle walls of the intestines from the central nervous system by the splanchnic nerves through the sympathetics; (2) by impairment or destruction of the energy of the neurenteric plexus and the myogenic force of the intestinal wall, both resulting from the poisonous action of toxins from the intestines or the peritoneal cavity, or from traumatism; or (3) by a combination of central inhibitory splanchnic impulses and an impairment or destruction of the energy of the neurenteric plexus, and the myogenic force of the intestinal wall.

Mechanical intestinal obstruction may be caused by adhesions, constricting bands, volvulus, intussusception, hernia, etc. If not promptly relieved, the bowel above the obstruction becomes dilated and paralytic; then the condition usually cannot be differentiated from the primary paralytic form.

In order to understand intestinal obstruction, it is necessary to have a thorough knowledge of the anatomy, physiology, and bacteriology of the intestinal tract. The motility of the gastro-intestinal tract is involuntary, except at the inlet and at the outlet, where voluntary control is essential so as to govern what enters and what passes out. The upper third of the esophagus is entirely controlled by the central nervous system, this control gradually disappearing toward the middle third, and being entirely abolished in the last third. The movements of the sigmoid flexure are partly voluntary, and those of the rectum are entirely so. In all other parts of the tract, motility is involuntary, and a nervous system, known as Auerbach's plexus, lies in the muscular walls and supplies the circular and longitudinal muscles, giving them force, after certain fixed laws, to propel the food, solid or liquid, through the alimentary tract.

¹ Zentral. f. Gyn., 1909, No. 1, p. 15.

² Transactions of the American Gynecological Society, 1909, p. 411.

The nervous supply to the stomach and the intestines from the central nervous system is through the vagi; from the sympathetic nervous system, it is through the splanchnics. The vagi impulses are mainly motor ones; under certain circumstances the impulses may be inhibitory; the latter, however, often temporary, inhibition being quickly followed by increased motility. The impulses through the splanchnics are inhibitory, and this action may be so increased by injury to the testicles, kidneys, or the posterior structures of the peritoneal cavity, or by a state of profound asthenia, as to hold in abeyance, temporarily, the neurenteric energy and myogenic force of the intestinal wall.

Digestion is nearly completed in the upper part of the intestinal tract between the mouth and a point slightly below the entrance of the bile and pancreatic juice. There is, however, little absorption in this part. The absorption of digested products occurs for the most part in the lower part of the duodenum, the jejunum, the ileum, the cecum, and the ascending and transverse colon to the splenic flexure. The splenic flexure, the descending colon, the sigmoid flexure, and the rectum are largely used for the storage and expulsion of feces and gas.

Ordinarily, food remains in the stomach or in any part of the intestine until it is acted upon properly. The proximal bowel then develops onward peristaltic waves of contraction, and simultaneously the immediate distal bowel relaxes so as to allow the food to move toward the least resistance. The proximal contraction and the distal relaxation continue in regular order until the food is passed into the cecum. These coördinating movements are easily disturbed by irritation or injury to the intestines, and in some cases of gunshot intestinal wounds the bowel becomes temporarily paralyzed, and the amount of fecal matter that would otherwise empty into the peritoneal cavity is thereby greatly lessened and the danger of infection is diminished.

In all forms of intestinal obstruction there is partial or complete destruction of peristalsis; the intestinal motion may be restored slowly, or remain permanently impaired. Even though the obstruction is complete, peristalsis below may be little, if at all, disturbed, the distal bowel being collapsed and apparently in a state of health, while the proximal gut is greatly distended with feces and gas, its walls filled with infarcts and practically dead. The same condition may be seen in mesenteric thrombosis, when there is neither mechanical obstruction, peritonitis, nor inflammation of the bowel wall.

In most cases of grave postoperative paralytic obstruction the patient becomes toxic as the result of absorption from the bowel or the peritoneal cavity. When the mechanical obstruction is removed, and the virulent poisonous contents in the distended and paralytic bowel above passes onward, its more rapid absorption in the comparatively healthy bowel below may cause a sudden increase of the toxic symptoms. The experiments of Ramzi, Kula, Clairmont, and Albu have shown that the

subcutaneous or intraperitoneal injection of the filtrate of normal intestinal contents gives nearly negative results, but that the injection of the filtrate from an obstructed and distended bowel caused serious or fatal symptoms, in some cases collapse being marked.

As a paralyzed bowel distends, the absorption of gas and liquids from its mucosa is diminished, and finally ceases, but the injury or destruction of the epithelial layer permits the absorption of bacteria or toxic products from the submucosa and muscular coats. After death of the bowel this absorption ceases.

Postoperative paralytic distention of the bowel may result from septic peritonitis, the infection coming from the gastro-intestinal tract, the pelvic organs, or an error in technique at the time of operation. A frequent contributing cause is extensive exposure and rough manipulation of the intestines. Rough manipulations injure the endothelial surfaces, the nerve plexuses, and the muscular constituents. Tension on the mesentery results in an increase of the splanchnic inhibitory impulses, causing distention of the bowel from impairment or destruction of its motility and peristalsis.

Mechanical obstruction always becomes paralytic unless promptly relieved by surgical operation. If there is too much delay, the bowel becomes greatly distended and the nutrition of its walls is so interfered with that bacterial invasion occurs. It is often impossible to distinguish between the early or even the late primary mechanical and the purely paralytic forms. The best results in these cases are obtained, by performing enterotomy or even enterostomy, so as to give immediate, temporary, or continued drainage of the bowel contents, thereby removing tension on the walls and lessening the absorption of toxic products. In such cases a subsequent operation may be done to remove the obstruction and to restore the attached bowel to its normal position.

In operating for postoperative intestinal obstruction, the original incision should not be used, but a point should be selected which will enable the operator to find and remove the obstruction with the least possible exposure and handling of the intestines. In this way one avoids opening a wound which is often infected and which might further infect the peritoneal cavity. When the seat of obstruction is a matter of doubt, the abdomen should be entered in the median line below the umbilicus. If the original opening, however, was made here, it may be better to open the abdomen over the appendix or the sigmoid flexure.

In true paralytic obstruction, surgery is usually contraindicated. There may be a few days of discomfort, with pain, nausea, vomiting, constipation, and distention, and yet uninterrupted recovery follows without treatment. It is not advisable to use purgatives, and no food should be given. If liquid and gas are regurgitated into the stomach, they should be promptly removed by a stomach pump and lavage.

Repeated vomiting of small quantities indicates a dilated stomach. Water should be supplied to the tissues by the method of Murphy, and if no gas is expelled from the colon, enemas may be given very carefully, not too much fluid being used.

When a patient is operated upon for paralytic or mechanical obstruction, and peritonitis is a complication, a rubber tube should be introduced to the bottom of the pelvis for drainage, and the patient should be put in the Fowler position. The author is decidedly against the use of remedies to stimulate peristalsis. Such treatment is positively contraindicated when there is peritonitis, inflammation of the intestinal wall, or an injury to the nerve plexus or the intestinal muscle. The intestines should be allowed to rest. The action of ergot and eserin is of little service, and atropine should not be given, because it abolishes vagi motor impulses, and impairs the spontaneous motion of the stomach and intestines.

Resection of devitalized intestine in paralytic obstruction, with the walls filled with bacteria and toxic products, is generally fatal. If undertaken, it should be performed quickly, and followed by lateral anastomosis. The bowel should be crushed well above and below the dead part in healthy tissue, and ligated with catgut in the crushed groove, the ends inverted and closed with a purse-string linen suture. The anastomotic opening should be three inches in length, and sutured as in gastro-enterostomy, the inner suture of catgut introduced through all the walls, linen being used for the outer seroserosus suture.

Acute Postoperative Dilatation of the Stomach. Polak,¹ in 1000 abdominal sections, had eight cases of acute gastric dilatation. Two patients died, having been septic for several weeks prior to the surgical operation—in one, appendicectomy, in the other, salpingectomy. Both had extremely low percentages of hemoglobin and red blood cells. The author believes that the blood count is significant, for invariably the red cell count was below 4,000,000, while the hemoglobin percentage ranged from 36 to 70 per cent. All the cases occurred in women, the youngest being twenty-four, the oldest being forty-eight years old.

In five cases the operation was done for a septic process within the pelvis. The patient had been placed in the Fowler position when the symptoms first became manifest, without exception. But one patient had had any previous history of gastric trouble. General anesthesia was used in every instance, the time consumed varying from thirty minutes to one hour and five minutes.

It is probable that the Fowler position favors constriction of the lower end of the duodenum between the root of the mesentery, which crosses in front of it, and the vertebral column. This is occasioned by traction on the mesenteric root and the mesenteric artery from the

¹ Transactions of the American Gynecological Society, 1909, p. 466.

suspension of the small intestine. Primary dilatation of the stomach due to the retention and fermentation of ingested food and drink doubtless increases the liability to mesenteric obstruction, for the intestines are crowded into the pelvis, and their escape from the pelvic cavity is prevented. Previous gastropptosis and enteropptosis certainly predispose to gastric dilatation. The transverse colon was noted well below the umbilicus in three patients at the time of operation. Seven were multiparous women with lax abdominal walls and some degree of diastasis of the rectus muscles. Two of this number had but recently given birth to children, and suffered from an intercurrent sepsis during the puerperium, which greatly reduced their general tone and the tonicity of the abdominal parietes, as well as the intra-abdominal contents.

Under such conditions, it is easy to see how primary dilatation of the stomach may occur, and become serious from motor insufficiency following general anesthesia, or from the too early ingestion of fluids after operation, or from the usual hypersecretion which follows ether. This statement was borne out by the two patients just referred to. They had very lax and pendulous abdominal walls, which permitted gastropptosis and enteropptosis in the elevated trunk posture. As no vomiting occurred immediately after the anesthesia, the house surgeon permitted water to be given freely by mouth. Epigastric distention was soon noticed, and unsuccessful attempts to relieve it by enemata were made, but as no vomiting occurred, larger quantities of water were allowed. The typical regurgitant vomiting of dilatation did not begin until thirty-six hours or more after the operation; it then continued persistently until the stomach tube was passed and the stomach emptied of several quarts of greenish fluid.

In five patients vomiting began at the end of the first day and was persistent and continuous, the vomitus coming up in large gulps, without strain or effort—simply regurgitation of mouthfuls of greenish flocculent material. It was temporarily checked by lavage, only to begin again as the stomach refilled with the hypersecretion of mucus and the back flow of bile from duodenal constriction.

One patient did not vomit for the first fifty hours, but there was enormous distention of the epigastrium, and no flatus was passed by the mouth or the rectum. All enemata were ineffectual. Distention continued, the pulse became accelerated and weak, until the stomach tube was passed and seven and a half pints of greenish-yellow fluid siphoned off. The stomach was then thoroughly washed. This resulted in the free expulsion of gas through the tube, and the distention was immediately relieved. A half pint of salt solution was left in the stomach and the patient placed in the right lateroprone posture, with the hips elevated so as to favor expulsion of the gastric contents by bringing the pylorus into its lowest position. Nothing was allowed

by mouth, but continuous enteroclysis was provided. The patient recovered.

Diffuse abdominal pain and unquenchable thirst were constant symptoms in all of the patients. The pain was paroxysmal and associated with visible peristalsis over the distended stomach. No elevation of temperature was noted except in one of the fatal cases, where it rose to 102.5° twenty-four hours before death. This, however, was probably due to an associated pulmonary lesion. The cardiac and respiratory rates were increased in direct proportion to the degree of distention. In all but one patient flatus was passed by the rectum as the result of enemata, and helped to exclude intestinal obstruction.

The dilatation in one case was but a part of a general involvement of the intestinal canal from peritonitis. In the other cases, dilatation occurred without any associated peritonitis due to some degree of duodenal constriction, which was either primary, or secondary to dilatation of the stomach.

The diagnosis of postoperative dilatation is not difficult if one bears in mind its possible occurrence. The intense thirst; the frequent and persistent regurgitant form of vomiting, appearing one or two days after operation, the vomitus coming up, without effort, by mouthfuls in large amount, and consisting of characteristic yellowish or greenish, sour-smelling, flocculent material—associated with little or no rise in temperature, but a slight and gradual increase in the frequency of the pulse; the marked epigastric distention, without tenderness or rigidity, while the lower part of the abdomen may be soft and flat, and the absence of leukocytosis are symptoms which strongly suggest the condition.

The vomiting usually does not begin until twenty-four or thirty-six hours after the operation, and may appear much later. The vomiting continues until the stomach tube is passed and the gastric contents siphoned off. The passage of the stomach tube makes the diagnosis positive.

The treatment in all these patients was begun immediately after making the diagnosis, and consisted of repeated lavage of the stomach with normal salt solution. The lavage was continued until the siphoned fluid was free from bile stain. A pint of warm saline was always left in the stomach before withdrawal of the tube and the patient turned in the right lateroprone posture, with the hips elevated. The foot of the bed was also elevated, and eserine salicylate, $\frac{1}{50}$ gr., with strychnine sulphate, $\frac{1}{30}$ gr., administered hypodermically. This procedure was repeated in eight hours, nothing being given by mouth. Nutrient enemata of saline solution, whisky, and panopeptone were used every four hours, and the lower intestinal tract was emptied from time to time by soap-suds enemata or by Kemp's colonic irrigation, the latter proving most successful.

The intense thirst was relieved and the salivary secretion stimulated by allowing the patient to use chewing-gum. After the stomach had regained its mobility, as shown by its capacity to empty itself, hard dry toast was allowed. The ingestion of solid food was encouraged as affording greater stimulus to the atonic stomach.

Permanent Incontinence of Urine after Labor. Miller¹ discusses long-continued or permanent incontinence of urine following labor. The urine escapes involuntarily during coughing, laughing, or any straining effort by which the intra-abdominal pressure is increased.

The changes in the urinary apparatus which permit this incontinence are chiefly of the posterior urethra and the neck of the bladder. After reading the views of a number of investigators, and studying his own cases, Miller is convinced that there is no single constant cause for the incontinence which appears after labor. The condition is seen in women immediately after labor, when the urethra is bruised, edematous, and swollen; its posterior portion perhaps dilated by pressure of the fetal parts against the symphysis; its nerve supply temporarily injured. As these troubles subside, the incontinence disappears.

In one of Miller's cases, incontinence was observed following a laceration along the side of the urethra; here it was accounted for by the partial cutting off of the urethral nerve supply and by the sagging of this structure; the urethra did not closely hug the under surface of the pubes and did not conform to Pawlik's idea that the anterior and posterior surfaces should lie in close contact at the point of flexure.

Baldwin, Skene, and Dudley think postpartum incontinence is due generally to dislocation of the bladder portion of the urethra from its attachment to the under surface of the pubic arch. Scanzoni, Fritsch, Kolischer, and others teach that this form of incontinence is due to a conically dilated posterior urethra, whereby the length of the urethra is diminished and the sphincter is overstretched and weakened; that the condition is brought about by a dilated and relaxed vagina and perineum, and a sagging downward of all of the pelvic organs.

Stoeckel believes that cystocele and dilatation of the posterior urethra are rarely, if ever, co-existent, and it is a matter of clinical experience that incontinence does not generally accompany cystocele. Miller's first two cases showed conical dilatation of the posterior urethra, and, in addition to an open, gaping vagina, a retroversion of the uterus, a condition which frequently accompanies a beginning prolapsus uteri. Stoeckel's two cases proved that incontinence may be the result of actual loss of the sphincter muscle from sloughing, and the case of Pousson indicates that not only the posterior urethra, but the whole canal may be dilated. Finally, the cases of Glas and Zuckerkandl

¹ Transactions of the American Gynecological Society, 1909, p. 745.

teach that defective local innervation, or a senile atrophy of the genitalia may be productive of incontinence.

The prophylaxis of puerperal incontinence is the proper conduct of labor, and, following labor, the careful and immediate repair of extensive lacerations of the vagina and perineum, and the prevention of infection. The incontinence which at times immediately follows labor need generally give no alarm, as it disappears with the subsidence of the edema, ecchymoses, and pressure paralysis. After a few weeks, the replacement of a retroposed uterus and the application of a well-fitting pessary not only supports the uterus and favors involution of the pelvic tissues, but, by the gentle pressure of the anterior part of the pessary against the urethra, tends to cure the incontinence. The application of a galvanic current has cured some cases. Stoeckel and others have successfully used injections of paraffin around the urethra. In persistent or increasing incontinence, some operative procedure is usually required.

The nature of the operation selected should depend upon the condition of the urethra and neck of the bladder. Cases in which there is a relaxed and gaping vagina should be treated by anterior and posterior colporrhaphy, an appropriate operation for retroversion if it exists, and the operation devised by Frank, for the incontinence itself. This operation consists of excising an oval piece of the anterior vaginal wall directly over the junction of the posterior urethra and the neck of the bladder. The excised piece is usually 3 cm. long and from 1 to 1½ cm. wide in the middle. In suturing, the muscle is gathered up so as to make a roll and narrow the urethral orifice.

Where there is marked dilatation of the urethra of long standing, or where, from necrosis, the muscular wall of the neck of the bladder and urethra are wanting, Gersuny's operation seems to offer the best hope of cure, and this operation is performed as follows: The edge of the meatus is fixed by means of two sutures, which act as guides. The meatus is encircled by an incision and the entire urethra dissected free, including as much of the surrounding tissue as possible. By means of this suture, the urethra is rotated until a very small catheter can be made to pass, and the urethra is sutured in its new position. Pawlik and Dudley also have devised operations which transplant the anterior extremity of the urethra, producing a kink or close apposition of the anterior and posterior walls.

Backache from Static, not Pelvic, Disorders. Reynolds and Lovett¹ have begun a study of the influence of corsets and high-heeled shoes upon backache of static origin, but often erroneously attributed to pelvic disorders.

In a study of the mechanics of the erect posture, the determination

¹ Transactions of the American Gynecological Society, 1909, p. 376.

of the centre of gravity is the starting point. The authors have elaborated a method which shows this automatically in any erect living subject at all times and in all attitudes. The authors argue that if it is granted that the abdominal ptoses are frequently the result of static conditions, then it is evident that an operation for the correction of a ptosis, undertaken in the face of general static conditions which constantly aggravate the displacement, is pretty sure to be either an anatomical or a symptomatic failure.

Again, for example, if some innocuous uterine peculiarity is attacked in order to cure a backache which is really dependent upon an over-strain of the sacro-iliac synchondroses, the result is not likely to be gratifying to the patient, or to add much to the reputation of the surgeon who does it; so, too, the orthopedic surgeon who devotes months of effort with apparatus and gymnastics to relieve a back pain caused by the faulty posture or the inflammation of pelvic organs, is likely to also score a failure.

What they venture to call static backaches have not been extensively or accurately noted. By static backaches, they mean those which are the product of a mechanical strain due to a faulty attitude. The faulty attitude may be originally the result of static imperfections, and may cause ptosis secondarily, by alteration of the intra-abdominal pressure; or the faulty attitude may be occasioned originally by an unconscious attempt to protect abnormal abdominal organs from undue pressure, and later, the faulty attitude may become so fixed by habit that it requires special treatment for the relief of symptoms even after the original abdominal cause is removed. The faulty attitude also may have been acquired by an unconscious action of the voluntary muscles to lessen pain.

In discussing the location of static backache, they call attention to the following anatomical facts. In considering what would be the probable character and location of pain in static backache, the following information is of importance. The entire weight of the body above them is, of course, transmitted to the ground through the sacro-iliac articulations. These articulations permit but little motion, and, compared to the supporting structures above and below, are relatively inelastic. In a given alteration of position in the standing attitude, necessitating a change of relation throughout the body in the antero-posterior plane, adjustment above this level is easy by the free motion between the vertebræ, and below this level the hips, knees, and ankles permit easy adjustment, all moving only within their normal limits. The sacro-iliac joints, however, are not easily adjustable, and will be more likely to show the effects of strain than the joints above or below, on account of their inability to accommodate themselves to it in their normal range of motion.

The sacro-iliac joints are relatively less protected by muscular support

than any other joints in the body. Above them the spine forms a long lever, and below, the thighs and the legs. The leg muscles all terminate at the pelvis, the lower spinal muscles take their origin on the iliac crest at about the horizontal level of the sacro-iliac joints. No important muscles pass *over* the level of the sacro-iliac joints to be inserted at enough distance above or below to contribute to them any efficient muscular support. So far as the lower two-thirds of the spine is concerned, the lumbar region is the flexible part, and adjustments to disturbing causes consequently are made chiefly in this region. Static backache, therefore, on theoretical considerations, would be most evident in the lumbar region and sacro-iliac articulation.

Static backache seems to be produced when the centre of gravity is thrown forward. The influence of corsets has been studied, and in a general way it may be said the authors believe that a suitable corset will restore the centre of gravity to its proper position and relieve symptoms. A good corset throws the centre of gravity backward, the trunk moving backward as a whole, but the buttocks, as a rule, somewhat more than the shoulders. The bad corset moves the centre of gravity backward also, but to a comparatively slight degree, and even this is affected by its throwing the buttocks excessively far back, while the shoulders are but slightly back, or in extreme instances, even forward. The strain thus imposed upon the sacrolumbar spine is easily appreciated.

The woman of a stable type of figure is but little altered in attitude by a corset. The unstable types are those who are most relieved by corsets. The main characteristic of all the stable types is that their figures run upward in a straight line above the base of support. The curves of their figures are not excessive, and any slight curve in one direction is promptly compensated by a similar reverse curve just above it. The common characteristic of all the unstable types is that they have very pronounced curves, and that the outlines of their figures tend to make wide excursions to one side and the other of the base of support. In the worst types, excessive curvatures in one direction are not fully compensated by the succeeding reverse curves.

Many cases of static backache are, and have been called: Hysteria, functional spine, neurasthenic spine, relaxation of the sacro-iliac joints, weak back, lumbago, etc.

High-heeled shoes which are made in the usual fashion, the heel reaching forward nearly to the middle of the foot, do not seem to have an undesirable effect in the standing position. They neither seriously change the inclination of the pelvis, nor alter noticeably the curves of the back. Apparently, high-heeled shoes modify the effect of the corsets, and the models upon whom the experiments were made were more comfortable standing in shoes and corsets than in corsets alone. The authors have found that static backache is usually relieved by proper corsets from the splinting of overstrained and irritable muscles,

and from restoring the centre of gravity to its proper position backward.

The Manifestations of Nervous Disorders by Pelvic Symptoms. Dercum¹ has analyzed 591 cases with a view of determining the frequency with which nervous disorders in women are accompanied by pelvic symptoms. They prove that operations on the pelvis and other viscera for the relief of nervous symptoms have no justification. It is perfectly clear that no operation should be performed which does not have a positive surgical indication. When this subject is fully understood, the fastening up of so-called loose kidneys, the removal of normal ovaries and tubes, of normal uteri, of normal appendices, of pieces of normal coccygeal bone, will cease, as will also repair of trivial cervical lacerations.

She shows, by the tables prepared, that there are more retropositions of the uterus without nervous symptoms than with them. The same is true of antelexion, laceration, splachnoptosis, and the malignant diseases. Dysmenorrhea, in almost every case, had symptoms of functional nervous disorders associated with it, indicating that dysmenorrhea in many instances is but one of the many phenomena of these nervous affections.

Uncomplicated retroversion has practically no symptoms and requires no surgical or medical interference. The experience of Waite and Robinson demonstrates that the position of the uterus deviates considerably, that anatomically and physiologically it is a movable pelvic organ and not an abdominal one, and to force it upward and forward, or to stitch it to the abdominal wall, disturbs its circulation and nerve supply and substitutes one pathological state for another.

Gynecologists should be skilled in functional nervous disorders. That many are not, was illustrated by the remark of a prominent teacher of gynecology, that a wandering pain was hysterical, and a fixed pain indicative of organic disease. That he was far from the truth may be recognized from the fact that hysterical pain is often so fixed in character that even the psychic impress made on the cerebral cortex by a removal of pelvic organs, normally or diseased, does not alter it in the slightest degree, and often makes it more fixed than ever. The well-informed gynecologist of the future will endeavor to have the fewest operations to his credit instead of the greatest number. The conservation of normal pelvic organs, and the restoration to health of diseased ones by medical means whenever possible, will be his highest aim.

Postoperative Psychoses. Kelly² discusses postoperative psychoses, and notes as alleged causes of postoperative insanity, infection, anesthesia,

¹ *Journal of the American Medical Association*, vol. lli, p. 848.

² *Transactions of the American Gynecological Society*, 1909, p. 426.

drugs, physical and mental exhaustion, shock, auto-intoxication, and lack of internal ovarian secretion. All authors agree that a predisposition, either hereditary or acquired, has been present in most of the subjects, and some assert that a normal person never becomes unbalanced as the result of an operation.

The majority of postoperative insanities belong to the group of "acute hallucinatory confusional insanities." Postoperative mental disturbances are probably as common in men as in women. Some writers believe that it occurs most frequently after gynecological or ophthalmological cases. According to Picqué, an outbreak is commonest in children, in old people, and in hysteropathics.

Kelly reports what he considers the true psychoses occurring in his own experience. He has excluded all except prolonged definite mental aberrations. Delirium, possibly due to infection or intoxication, cases with a history of alcoholism or drug habit, and cases of infection have been left out. In a few of the cases there had been a mild infection, but the mental state did not bear any relation to the fever and intoxication.

Mild mental disturbances following operation are quite frequent. It is exceedingly common to note some change of humor after operation, and by close attention it is remarkable how many women manifest some well-defined vagary in disposition—irritability, depression, suspiciousness, etc., which vanishes in a day or two. In a consecutive series of 1300 cases at Kelly's private hospital, there have been no less than 50 such cases, or 1 in every 26. Excluding this milder group, in about 16,000 operations, Kelly has had 40 severe cases, or 1 in each 400.

Upon analyzing them, it appears that the psychoses were as common after mild as after severe operations. In none was there extreme physical exhaustion. In but 12 of the 40 had both ovaries been removed. The anesthesia seemed to have little to do in producing the condition. He does not think that iodoform has any bearing upon the matter. He is inclined to believe that those who are mentally tainted, neurotic, alcoholic, or of luetic ancestry are predisposed. Those who have previously been insane are likely to have a recurrence after operation. In 10 of the 40 cases, there was a marked history of nervousness, hysteria, and neurasthenia for long periods before the operation.

He is convinced that although there may be some mental instability in most instances, the perfectly sound person may develop a postoperative psychosis.

The majority of cases develop between the second and tenth days. Eight in his series started almost immediately after operation. The duration is variable; the longest period was forty days; the shortest period was two weeks, advancing from this up to permanent insanity. Of 15 cases occurring in his private hospital, 13 recovered and continued so, 1 remained mildly demented, and 1 is persistently insane.

In order to avoid this complication, it is advisable to inquire into the family and personal history. One should inquire as to whether the patient has been greatly worried, how much they dread the operation, and whether they are sleeping well. When unfavorable conditions exist, and the operation is elective, it should be put off until things are more favorable. Before doing any operation, secure, if possible, the entire confidence of the patient, gradually bringing her to look upon it as a small and normal thing. *Disabuse the mind of all gossip and false belief* given by well-meaning but foolish acquaintances, especially the dread that the operation may change the psyche. If the family tend to excite the patient, exclude them from her room. Above all, secure discreet, cheerful, congenial, and patient nurses.

When the psychosis has once arisen, in the mild and early stages the patient must be kept in a quiet room; a nurse must be in constant attendance, lest the patient do herself some harm. She must be fed regularly, but not forced. The bowels should be kept open, and plenty of fluid given. All implements or ways in which the patient can do herself injury must, so far as possible, be removed. Sedatives in the restless patients are sometimes necessary, but must be given with care; morphine, as a rule, is contraindicated. When, after a week or so, the patient does not clear, it is Kelly's practice to put the treatment into the hands of a competent alienist. It is not infrequently necessary to transfer the persistent and violent patients to an asylum.

While postoperative psychoses are often seen in childhood and in the aged, they occur most frequently between the ages of thirty-five and forty-five.

The *prognosis* is favorable. Care should be taken to avoid any legal or forensic complications by frank dealing with the family from the onset of the trouble.

Normal Variations in Structure of the Endometrium. Gardner and Novak¹ have investigated the normal histology of the endometrium, with special reference to the modifications thereof which are associated with the menstrual cycle.

The work is based upon the microscopic examination of the uterine mucosa from over 200 cases in the Gynecological Clinic of the Baltimore City Hospital during the past three years. In order to study the menstrual phenomena, there was selected from the entire number a series of fifty, in which an accurate record of the menstrual history was available, including the date of the onset, and usually of the termination of the period preceding the operation.

From the work of Hitschmann and Adler, it appears that from one menstrual cycle to the next, the endometrium presents a constantly changing histological picture. This cycle of changes may be divided

¹ Journal of the American Medical Association, 1909, vol. liii, p. 1155.

into four phases—postmenstrual, interval, premenstrual, and menstrual. At the height of the menstrual flow the mucous membrane diminishes in thickness and the glands pour out their secretion, becoming narrow and straight. The surface epithelium is frequently lost, but this is not an invariable rule. After the period, there takes place a very rapid cell growth in both the epithelium and connective tissue. The glands become larger and wider, although still quite narrow and straight. The epithelium is low and in a condition of rest. By about the fifteenth day the cell growth of the epithelium has progressed to such an extent that the glands become somewhat tortuous, and often assume a spiral or corkscrew-like appearance. Finally, six or seven days before the beginning of menstruation, the glands rapidly enlarge and become tortuous, the cells bulge into the lumen, the epithelium becomes higher and broader, and the lumen is filled with a mucous secretion. These gland changes are much more marked in the deeper portion of the mucosa than in the superficial, so that there is produced a well-marked differentiation between a superficial compact and a deep spongy layer. In this respect there is a marked similarity to the appearance of the young decidua, the resemblance being increased by the fact that the interglandular stromal cells in many cases assume an appearance very similar to or approaching that of decidual cells.

The authors are able to confirm the observations of Hitschmann and Adler, but they believe these authors to have taken an extreme view in practically asserting that glandular changes do not occur except in connection with the menstrual process. Both animal experimentation and clinical observation indicate that the actual underlying cause of menstruation is the secretory activity of the ovary, which produces an internal secretion or hormone essential for its occurrence. The principal effect of this substance seems to be of a vasomotor nature, and is exerted especially on the pelvic bloodvessels. It is only natural to suppose that the endometrium plays a purely passive role in this phenomenon, and that the histological changes observed in connection with menstruation represent merely the reaction of the endometrium to the process—a reaction which may, however, be elicited by other influences than that of normal menstruation.

Dry Heat as a Therapeutic Agent. Gellhorn¹ speaks of the use of dry heat as a therapeutic factor in gynecology. He notes the fact, which Bier has pointed out, that every functioning organ is hyperemic during the period of its activity. Local hyperemia is present in the growth of an organ as well as in the regeneration of tissues. In pathological conditions, too, irrespective of their origin, hyperemia may be found, but never anemia, and it is thus forced upon us that hyperemia represents the reaction of the organism against disease; in other words,

¹ American Journal of Obstetrics, July, 1909, p. 31.

the body utilizes hyperemia as one of its defences, by means of which it endeavors to overthrow its enemies.

According to Bier, active arterial hyperemia has the property of promoting absorption and reducing pain. The best means of causing active hyperemia is heat, and dry heat in the form of hot air has given the best results.

Gellhorn describes the apparatus first used by Bier for this purpose, and the one devised by Stein. A modification of Kehrér's apparatus, which he has used with success, consists of two semicircular cradles made of thin sheet-iron and covered on the inside with asbestos. These two cradles fit one over the other, and may be pulled apart in the fashion of a telescope. On the inside of the free edges electric-light bulbs are attached, eight in all, and there is a long suitable attachment for the nearest socket. A hole in the convexity of the cradle is provided for a thermometer. The mercury bulb of the latter should be about two or three inches above the abdomen, so as to register the actual temperature of the immediate surroundings and not the temperature of the air in the upper portion of the chamber, which naturally is warmer than in the lower portion. If no thermometer is used, this hole may serve as a chimney through which the hot moist air can escape. There are also a number of hooks from which gauze bags filled with calcium chloride may be suspended, in order to absorb any excess of moisture within the air chamber.

This apparatus has many advantages. It is light, and easily portable; it is clean. There is no danger from fire, although care must be taken to prevent the calcium bags from touching the electric bulbs, lest they explode. The heat can be easily regulated by eliminating one or more bulbs, and so burns of the skin can be readily avoided. By changing the candle-power of the bulbs, any desired degree of heat may be obtained. By pulling the cradles apart, a larger portion of the body, or even the entire body, can be heated according to the indication.

The mode of application is exceedingly simple. The apparatus with the thermometer carefully adjusted is placed over the exposed abdomen and the electric light turned on. It is preferable to increase the heat gradually, and, therefore, the apparatus is not covered with blankets until after a few moments' exposure. The degree of heat obtained can be noted at any time, and may be reduced or increased at will. While the temperature can be raised easily to 300°, yet from 200° to 220° seems the best temperature, and this degree is reached with eight 16-candle-power bulbs within fifteen or twenty minutes. As the reaction of patients may vary in the individual case, they should not be left alone, and the pulse should be watched carefully. A cold cloth is placed on the forehead of the patient, and she is urged to drink large quantities of cool water.

The patients at first feel quite comfortable. In about ten minutes,

when the temperature reaches 180° , they frequently complain of an intense burning. It is imperative then to discontinue the treatment for the time being. The sensitiveness decreases at each application, so that after a few days the baking process may be continued for one-half hour or even longer, the temperature being raised to 220° . The patients perspire profusely over the entire body, especially on the abdomen. The exposed skin becomes intensely red, either diffusely or in more circumscribed areas.

The immediate effect of the treatment is a marked decrease of pain, the appetite improves, and large quantities of water can be taken. Many women gain in weight, and constipation is relieved. Many patients have a pleasant sensation of relaxation and a refreshing sleep. Burns of a mild degree may occur, but can be avoided with proper precautions. The author has observed small blisters in two cases only where there was profuse perspiration and the skin had not been promptly wiped off.

There is no absolute rule as to the length of the treatment or the degree of heat. It is best to go slowly, and the temperature should never be raised while the patient complains of heat. After treatment, the patient should be permitted to cool gradually, being left in the apparatus for one-half hour or wrapped in warm blankets. A cool sponge bath may be given directly after the treatment.

The first and principal indication for this form of treatment is found in chronic parametric and perimetric exudates. Induration following surgical operation is influenced decidedly. In the overwhelming majority of cases the exudation is absorbed more or less quickly. The number of treatments varies in the individual case from eight to thirty-five. The hot-air treatment is contraindicated as long as there is any fever, and it should be discontinued at once if fever appears after one or two applications.

Hot air has also been employed in the treatment of menstrual disorders, with the idea of improving the health of the parts by an increase of the blood supply. The author has relieved two virginal women who suffered with dysmenorrhea. The treatment was given the week preceding the flow, and the former pain totally disappeared. Finally, the method is valuable in the management of patients after operation, especially to overcome the shock which follows severe and prolonged laparotomies.

Polano and Kehrler have used dry heat for infiltration of the abdominal walls along the celiotomy incision, with satisfactory results, and the author has employed it successfully in two cases of infiltration of the perineum following perineorrhaphy. The treatment is also useful in cases of recent postoperative adhesions. In such cases the author does not hesitate to apply the treatment after the sixth day. This was particularly successful in cases of ectopic pregnancy where numerous fresh adhesions had been severed during operation.

DISEASES OF THE BLOOD. DIATHETIC AND METABOLIC DISEASES. DISEASES OF THE THYROID GLAND, NUTRITION, AND THE LYMPHATIC SYSTEM.

BY ALFRED STENGEL, M.D.

THE BLOOD.

Pernicious Anemia. The literature of the past year contains few noteworthy contributions on this subject. With closer and more accurate methods of investigation, the term is being applied to fewer cases each year. Many of the cases previously classed as pernicious anemia are now placed under the head of the secondary forms.

ETIOLOGY. The question of hemolysis as a factor in the production of pernicious anemia has been considered by a number of investigators, and interest in this phase of the subject has been especially active during the past year. Vetlesen¹ refers to Tallquist's research on anemia caused by the bothriocephalus, in which he found that a hemolytic substance present in the parasite was responsible for the anemia. This substance proved to be oleic acid, both its cholesterin and sodium salts having hemolytic properties. In normal conditions there is not much cholesterin in the blood, but when it reaches a certain concentration the hemolytic action follows. Tallquist suggested administration of calcium to form an insoluble compound with the oleic acid, or of glycerin, which unites with oleic acid to form ordinary olein, the harmless oleate of glyceryl. Vetlesen has been applying the result of these abstract searches in the clinic, and reports a case of pernicious anemia with hemoglobin of 40 per cent. and only 1,110,000 red cells, in which, after failure of other measures, he gave the patient a tablespoonful of glycerin with a little lemon juice three times a day. After a course of five months of this glycerin treatment alone the hemoglobin increased to 100 per cent. and the red cells to 4,400,000, with a gain in weight of twenty-five pounds. Vetlesen argues that the favorable results sometimes seen in pernicious anemia from treatment with bone-marrow extract may have been due to the glycerin vehicle.

In a later paper² he reports another case, in which there was a gain in

¹ Norsk Magazin for Laegevidenskaben, December, 1908.

² Ibid., October, 1909.

hemoglobin from 20 per cent. to 90 per cent., an increase in the red cells from 990,000 to 4,700,000, and a gain of twenty pounds in weight.

Whipple¹ finds that the hook-worm contains in all its parts a weak hemolytic agent soluble in salt solution. It is not specific, and he regards it as unlikely that it has any relation to the anemia of uncinariasis.

Gluzinski² reports the case of a servant, aged twenty-four years, with a red count of 760,000; hemoglobin, 26; leukocytes, 34,000 to 100,000. Neutrophilic myelocytes to the number of 4.4 per cent. were found, very large numbers of normoblasts and megaloblasts, polychromatophilia, and poikilocytosis. Blood culture was negative. Examination of the stools was also negative. Gastro-intestinal symptoms were prominent. At autopsy nothing was found to explain the symptoms except that in the thin yellow fluid contained in the ductus choledochus was a rolled-up flat mass of parasites, determined to be the distoma hepaticum. He regards this case as of doubtful origin, because the paucity of literature upon the subject prevents comparison with other cases. He quotes Inouye, writing in the *Archiv f. Verdauungskrankheit*, 1903, p. 108, as mentioning a distoma infection, but without the severity of the symptoms mentioned by Gluzinski. He inclines to the opinion that the jaundice present in this case was not mechanical, but due to destruction of the red blood cells, and hopes for reports of further cases.

Talma³ reports the case of a farmer, aged twenty-eight years, who succumbed to pernicious anemia after showing symptoms for eight years. The findings in the stomach indicated a reactive secondary inflammation, probably the result of poisons generated in the intestines. He does not regard the gastric disturbance as primary.

Faber⁴ states that out of 125 cases of chronic gastric achylia, 12 of the patients presented the symptoms of progressive pernicious anemia. Besides this group, there were a number of young women with gastric achylia accompanying anemia, which persisted for years uninfluenced by any therapy. In one case iron was given for three years, with only slight transient benefit. He regards this as a special form of anemia plus achylia, distinguished by its protracted course and resistance to treatment.

Berger and Tsachiya⁵ have pursued their investigations in cases of cryptogenic pernicious anemia, and have isolated from the gastric and intestinal mucosa a lipoid substance soluble in ether, which is ten times as soluble as the lipoid obtained from the normal stomach. Experimentally on animals it shows weak but definite hemolytic properties, when given subcutaneously or by mouth. That obtained from normal mucosa exerts less action or none. The resulting anemia is of the pernicious

¹ Journal of Experimental Medicine, March, 1909.

² Wiener klinische Wochenschrift, 1909, v. i, p. 6.

³ Medizinische Klinik, August 29, 1909, vol. v, No. 35.

⁴ Ibid.

⁵ Deutsches Archiv f. klin. Medizin, 1909, vol. xevi, p. 252.

type. In dogs it was possible to obtain a lipoid similar in action, after first causing a gastro-intestinal catarrh. A justifiable conclusion seems to be that the origin of the cryptogenic form of pernicious anemia is to be found in the hemolytic action of the lipoid with secondary insufficiency of the bone-marrow. The place of origin of this hemolytic lipoid is probably in the gastro-intestinal mucosa as the result of a chronic inflammation.

Mr. L. S. Dudgeon¹ reports eleven cases of pernicious anemia, in nine of which "the serum presented a yellowish-green coloration which was quite distinctive. There was no reaction for bile pigment, and it failed to give any spectrum. In the remaining cases, the coloration was obscured by the presence of bile pigment." In his experience, apart from pernicious anemia, the reaction did not occur, even in three cases in which the blood picture was identical with that found in this disease. It had been suggested that the anemia was dependent upon the presence of a substance or substances in the serum, which allowed the red cells to be taken up by the phagocytes in the blood. From the observations conducted in the present research, there was nothing to support this view when immune serum and immune red cells were incubated in the presence of normal leukocytes. With regard to pernicious anemia, however, it was shown, as in the case of the hemolysins and hemo-agglutins, that phagocytosis of the immune red cells by normal human leukocytes occurred in the presence of normal serum. These observations upon pernicious anemia, and similarly in certain other diseases, lend support to the view that the red cell itself must be reckoned with in observations on immunity. Although it is impossible at the present time to demonstrate many of the most important points concerning the blood immunity of pernicious anemia, yet it is known that phagocytosis of red cells, mainly by endothelial cells in the various tissues, and also hemolysis was recognized. How far these changes are directly related to the terminal changes in the disease, and how far to its actual source, remains to be seen. He considers that there is no evidence to show that auto-infection by streptococci and the resulting auto-intoxication were in any way related to the pathology of the disease.

AGE. Morse² considers that the diagnosis of pernicious anemia in infancy is very difficult, if not impossible, because of the fact that any secondary anemia at this age may take on characteristics which are considered pathognomonic of this disease in later life. "The presence of marked variation in size, shape, and staining characteristics of the red blood corpuscles, of nucleated forms, whether large or small, of myelocytes even in considerable numbers, and of a relative lymphocytosis, are, therefore, of little assistance in diagnosis at this age." He considers that, if pernicious anemia does occur in infancy, the blood changes are the

¹ British Medical Journal, 1909, vol. i, p. 535.

² Journal of the American Medical Association, February 6, 1909.

same as in later life, and that the metaplastic type is by far the more common. He quotes Petrone as reporting the only case of the aplastic type of which he has knowledge.

BLOOD. Morris¹ considers the most important signs of regeneration of the blood in anemia to be the occurrence of nucleated red blood cells, of basophilic granules in the red cells, and of polychromatophilia. He adds to these facts the presence of nuclear particles in the erythrocytes. He has found them in the blood of patients suffering from pernicious anemia, in anemia of infants, in secondary anemia, in chronic myeloid anemia, and in anemia in a case of splenectomy for splenomegaly. They were present in smears of the bone marrow of the femur in pernicious anemia. In animals they have been found in healthy adult cats, in pregnant rabbits, and in animals in whom regeneration of the blood is going on. In the blood of embryonic cats, rats, and mice, as well as in the blood of the human embryo, they are also present. "Since they are found in the bone marrow and are almost always associated with other evidences of regeneration of the blood, nuclear particles may safely be considered a sign of regeneration." He states the differences between them and Howell's bodies, and his reasons for believing that they are not the same as basophilic granulations. They usually occur singly, are usually eccentric, may occur in the normoblast or megalocyte of the bone-marrow, or in the erythrocyte, the normoblast, or the erythrocyte with basophilic granulations, in blood smears. They can be differentiated from the latter by staining with Pappenheim's methyl-green-pyronin mixture after heat fixation. The nuclear particles stain blue like the nucleus. The basophilic granulations stain red. Von Stark² takes up the question of basophilic granulation. He considers that this possesses a theoretical interest even though the works of many writers have shown that it possesses no practical importance. He attempts to differentiate basophilic granulation of the red cells from other substances showing basophilic properties which are peculiar to themselves, and which have only received sharp differentiation since the subject of basophilic substances has been given more attention. He refers especially to the nuclear particles which occur in megaloblasts with nuclear destruction, three or four or more, and which never show a transformation to the uniformly free particles of basophilic granulation, and which stain like the nuclei themselves, blue with pyronin-methyl-green, red with Giemsa, and green with methyl green. The basophilic pigment of the red cells in malaria must be differentiated, and also a special kind of basophilic substance found by Schmauch in cats, and by Schur in human blood in *Morbus Basedowei*.

Basophilic granulation in a narrower sense means the presence of

¹ Archives of Internal Medicine, vol. iii, p. 93.

² Jahrbuch f. Kinderheilkunde, N. F., Band xix, p. 264.

more or less numerous particles in the erythrocytes, with fixed protoplasm after staining with basic stains. The granules are usually equal in size, either few and large, or fine and numerous, or even giving the impression of finest dust. He discusses Engel's proposition that basophilic granulation is a stage in the disappearance of the nucleus of the normoblast. Von Stark finds them in the early months of fetal life, but not in the later months, and concludes that they have no connection with the loss of nucleus.

SYMPTOMS. According to Herbert French,¹ no case can be considered one of pernicious anemia "that has not at one time or another exhibited oligocythemia with a high color index and no leukocytosis during life, and, should death occur, a definite Prussian-blue reaction in the liver." He discusses pernicious anemia from the following standpoints:

1. The temperature chart of pernicious anemia cases.
2. Pigmentation of the buccal mucous membrane.
3. Size of the spleen.
4. Nerve symptoms.
5. Variability in the color index.
6. Injustice of the epithet "pernicious" in some cases.
7. The difficulty in accurately dating the beginning of the illness.

1. He finds that by the time a patient is brought to the hospital—in other words, by the time the diagnosis is made—there is a fairly constant evening *temperature* of 99° to 100.5°, and that there is little tendency to subnormal temperature taken at 10 A.M.

2. He reports two cases which showed *pigmentation of the skin and buccal mucous membrane*. In both cases a diagnosis of Addison's disease was considered and rejected.

John Aitken² also reports two cases of pernicious anemia with pigmentation of the skin and buccal mucous membranes. In the first case the patient had taken no arsenic, and the case was described as typically "progressive." These spots on the buccal mucous membrane were situated on the palate and lips symmetrically, on the cheeks irregularly, and where the teeth were missing. The color varied from light patchy brown to deep homogeneous chocolate. The spots were not raised, nor were they sensitive. They were likewise scattered all over the body. In the second, a slight degree of pigmentation of the skin was present, but none was noted on the mucous membranes.

3. Out of 56 consecutive cases observed, 18 showed *enlargement of the spleen*, palpable below the costal margin. In 9 of them the liver also was palpable. Eleven of 14 spleens observed at autopsy weighed more than normal.

4. Twenty-nine out of 58 cases presented *nervous symptoms* varying from subjective numbness of the fingers to a definite spastic paraplegia.

¹ Clinical Journal, London, May 5 and 12, 1909, Nos. 862 and 863.

² British Medical Journal, 1909, vol. i, p. 1349.

It more frequently happened that a few symptoms of some spinal disease were present than that the whole symptom complex could be demonstrated.

Gordon¹ reports the autopsy findings of a case of pernicious anemia that presented spinal-cord symptoms. The prominent changes were a diffuse degeneration of the spinal cord, which affected not only the posterior columns, but also the lateral motor and sensory tracts and the anterior portions of the white substance of the cord.

5. A high *color index*, although required for the diagnosis of pernicious anemia, may not be present in one count or a small series of counts. As general, though not invariable, rule, the sicker the patient, the higher the color index; the more improved the patient, the lower the color index.

6. He considers the term "pernicious" as ill advised, because out of 40 cases, 15 lived from one to ten years after the recognition of the symptoms, and 4 of these were alive from six to ten years after a diagnosis was made. He prefers the older term, "Addison's anemia."

7. All of the 58 cases gave *symptoms dating back some time* before the recognition of the disease, varying from one month to over five years. Thirty-five of these gave histories which, in the light of their later symptoms, justified fixing the date of the beginning of the disease at more than one year before. One case seemed to show no lack of continuity of the symptoms for fifteen years before its recognition.

Melland² catalogues the symptoms of the disease as follows: Breathlessness upon slight exertion, faintness or actual syncope, great muscular weakness, these and cardiac palpation, all symptoms of any severe anemia. In addition, there are special features, such as a peculiar yellow color of the skin suggesting jaundice; numbness and tingling in the hands and feet as a result of lesions in the peripheral nerves and spinal cord; the presence of small ulcerations and red patches about the tongue, lips, and gums; soreness in the esophagus and stomach; vomiting, and occasional attacks of diarrhea, with the passage of pale, clayey and sometimes frothy stools. He tabulates the *most important conditions that may produce anemia* so profound as to bear as close clinical resemblance to the so-called primary pernicious anemia, as follows:

1. Diseases of the hematopoietic and lymphatic systems, as leukocythemia, either splenomedullary, lymphatic, or more particularly, acute; leukanemia, a condition probably closely allied to acute leukocythemia; and primary aplastic anemia.

2. Carcinoma of the stomach.

3. Repeated small hemorrhages.

4. Long-standing cases of septicemia, in particular, ulcerative endocarditis.

5. Severe chlorosis.

¹ New York Medical Journal, July 3, 1909.

² British Medical Journal, June 5, 1909, p. 1347.

6. Chronic Bright's disease.

7. A number of secondary causes of severe anemia—scurvy, malaria, syphilis, phthisis, infection of the intestine with *bothriocephalus latus* or *ankylostoma duodenale*.

He gives the characteristic feature of the blood count as follows:

1. Marked reduction in the number of the red cells— 2,000,000 to 1,000,000 or below.

2. Reduction of the number of leukocytes to 3000 or 2000, or less. This reduction is chiefly in the polymorphonuclear neutrophiles, so that the lymphocytes are relatively greatly increased.

Staining characteristics he notes as follows:

1. Average of each red cell is larger than normal—macrocytosis.

2. There is much diversity in the shape of the individual cells—poikilocytosis.

3. Red corpuscles take the basic blue stain, in addition to the acid eosin stain, giving a greenish tint to the cells—polychromatophilia.

4. The presence of granules in the red cells, staining with methylene blue—granular or basophilic degeneration.

5. The finding of nucleated red cells. Unless megaloblasts are present he does not lay much stress upon their presence, for he believes that normoblasts are not uncommon in many forms of severe anemia.

Hesse¹ calls attention to a sign that is not mentioned by any of the other writers of the year. In 47 out of 50 cases of pernicious anemia, *retinal hemorrhages* were found to be present. In 50 cases of severe secondary anemia with hemoglobin below 50 per cent., and in 121 cases with the hemoglobin between 50 per cent. and 70 per cent., retinal hemorrhages were never found. Likewise, in 64 cases of malignant tumor, no retinal hemorrhages were found. He has observed that the severity of the hemorrhages is proportionate to the degree of anemia, and their disappearance is a sign of improvement.

Brenner² has estimated the *antitryptic strength of the blood serum* of a number of cases of chlorosis and anemia with no discoverable lesion, or else lesions not sufficient to account for the degree of anemia. He finds, with very few exceptions, that the antitryptic strength of the serum of these patients is raised. He considers the ratio of 1 to 3 or 4 as normal, and has found that the antitryptic strength of the cases that he has investigated ranges from 1 to 4 to 1 to 10. Natural arsenic water, obtained from a spring in the Palatinate, was given to the patients for five or six weeks in ascending doses, 45 c.c. up to 140 c.c. daily, and then descending to 45 c.c. The antitryptic strength was again taken at the end of this course of treatment. In all but two cases it was lowered; in these two it remained the same, the range being from 1 to 3 to 1 to 7. In all the cases the hemoglobin and red cells were appreciably raised. A trial for a similar

¹ Deutsche medizinische Wochenschrift, No. 32, vol. xxxv, p. 1394.

² Ibid., No. 9, vol. xxxv, p. 390.

space of time with arsenic pills containing the same amount of arsenic as the water produced improvement, but not nearly so marked as the water. His conclusions are as follows:

1. In nearly all cases of pure anemia and chlorosis there occurs a raising of the antitryptic strength of the blood serum, bearing, in general, a relation to the severity of the disease.
2. Definite relationship between the antiferment strength and the red blood count or hemoglobin estimation does not exist.
3. In cases in which the red blood count and the hemoglobin estimation denote a mild degree of sickness, the decided elevation of the antiferment strength proves the severity of the disease and permits a more accurate prognosis.
4. The falling and rising of the antitryptic strength is a sure and simple means of recognizing the steps in the improvement of the anemia and of the general condition of health, and is of use in judging the results of treatment.
5. By means of a natural arsenic water rich in salts, patients in a comparatively short time showed a decided improvement of the blood-picture, of the general condition, and of the accompanying nervous disturbances.

DIFFERENTIAL DIAGNOSIS.—In discussing this phase of the question, Clerc and Gy¹ warn that pernicious anemia secondary to gastric cancer may obscure the presence of the tumor. Examination of the blood, clinical symptoms, and theoretical bases all fail to distinguish this anemia from progressive pernicious anemia. In one case, the only symptom suggesting cancer was continuous occult hemorrhages from the digestive tract.

Melland² distinguishes chronic leukocythemia, acute leukocythemia, and leukanemia from progressive pernicious anemia in the following manner:

1. Chronic leukocythemia (leukemia) (*a*) rarely presents a high degree of anemia; (*b*) the great enlargement of the spleen in the splenomedullary form and of the lymphatics in the lymphatic form should suggest the nature of the disease; (*c*) the large increase in the leukocytes in stained films should settle matters.
2. Acute leukocythemia (leukemia) (*a*) resembles pernicious anemia in the profound anemia and in the occasional absence of the enlargement of the spleen and lymph nodes; (*b*) the increase in the number of lymphoid cells—the larger forms preponderating—is usually necessary to settle the diagnosis.
3. Leukanemia resembles pernicious anemia in the profound anemia, high hemoglobin index, and large average size of the corpuscles. Though there is no increase in the number of leukocytes (possibly a decrease),

¹ Archives des Maladies du Cœur, April, 1909, vol. xi, No. 4.

² Loc. cit.

myelocytes and the large lymphoid cells are seen in considerable numbers, which brings it into the catalogue of leukanemia-like diseases.

TREATMENT. Although Cabot, in Osler's *Modern Medicine*, vol. iv, p. 636, says, "*Transfusion of blood* from a healthy individual to a patient with pernicious anemia is not to be recommended and should not be done," several attempts at treatment by this method have been made. E. Sachs,¹ reports a case of pernicious anemia, typical in every respect which declined steadily under injections of sodium arsenate. Careful examinations of the body and the various excretions failed to show any cause for the anemia. He removed 400 c.c. of blood from the vein of a healthy individual under strict aseptic conditions. This was defibrinated by shaking for twenty minutes and then filtered, being kept at a temperature of 42° C. About 250 c.c. of this was injected into the patient's arm in the usual way in which intravenous infusion is given. In six weeks the red cells had risen from 980,000 to 3,725,000; the hemoglobin from 20 per cent. to 75 per cent., and the leukocytes from 3000 to 6500. The improvement in health was coincident with that of the blood.

Weber² reports 7 cases from Voit's medical clinic at Giessen, in which threatening anemia was influenced to a marked extent by transfusion of only 5 c.c. of human blood. No benefit was observed in a number of cases of leukemia. The transfusion of this small amount is simple and generally harmless, but in a few cases there were signs of mild disturbances after the transfusion. It seemed as if the blood from certain persons displayed more toxicity than from others, three persons injected with a certain blood all presenting the same transient disturbances. It was never noticed that when two or more patients received blood from the same source, one presented disturbances and the others did not.

Robert Lucy³ mentions a case of pernicious anemia occurring in his practice with a red count of 1,800,000, hemoglobin 35 per cent., and megaloblasts. The diagnosis of pernicious anemia was concurred in by several physicians. Transfusion of blood was performed, and in one month the patient was discharged with a red count of 3,200,000, hemoglobin 85 per cent., and no megaloblasts. Five months later the patient reported herself in good health.

Irrigation of the bowel has been advocated by several clinicians. Witherspoon⁴ reports 11 cases of progressive pernicious anemia, in 10 of which gastro-intestinal symptoms were present, "either preceding or developing during the course of the disease." All presented the true blood picture of pernicious anemia. In 10 cases there was a true achylia. In 1 case, which resisted all forms of treatment, and which showed 95 per cent. of anærobie bacteria in the stools, appendicostomy

¹ Zeitschrift f. Geburtshülfe und Gynäkologie, Band lxiv, p. 336.

² Deutsches Archiv f. klinische Medizin, vol. xcvii, Nos. 1 and 2.

³ Medical Record, vol. lxxv, p. 399.

⁴ Lancet-Clinic, Cincinnati, vol. ci, No. 13, p. 346.

was performed and colonic irrigation employed. Fifteen hundred c.c. of salt solution was used. At the time of operation the red cells numbered 1,110,000, the leukocytes 3500, and the hemoglobin was 50 per cent. Hydrochloric acid was absent from the stomach; lactic acid was present. Indican and skatol were found in large amounts in the feces. The patient had been receiving large doses of arsenic and colonic irrigation twice daily by the rectum. Ten days later, following the operation, the red cells were 2,600,000, hemoglobin was 51 per cent. About six months later they were, respectively, 3,600,000 and 62 per cent., with the leukocytes at 7000. No nucleated red cells or poikilocytes were present. Anærobic bacteria were present in the stools in normal quantities, as were also indican and skatol. Hydrochloric acid returned in the stomach in small amounts, and lactic acid was absent.

Satterlee and Sabel¹ report two cases, with the typical blood picture of pernicious anemia and severe gastro-intestinal symptoms, in whom rectal irrigation afforded a temporary relief. Medication with iron and arsenic had given no help in either case. Both cases relapsed, one coming to autopsy, and the other disappearing. Microscopic examination of the stomach showed an infiltration of small round cells around the glands and a desquamation of glandular epithelium. The intestine was very much congested, but contained no parasites.

Byron Bramwell² describes a case of pernicious anemia with a color index of 1.2 and a red count of 545,000. *Arsenic*, in the form of Fowler's solution, up to ten drops three times a day over a period of a month, brought the index down to 1.06, and the red cells up to 1,900,000. Treatment along the same lines for another month resulted in the figures 1.2 and 1,600,000 respectively. Bland's pills were given for a month, and a count taken at that time showed hemoglobin, 55 per cent.; erythrocytes, 2,900,000; color index, 0.8. A month later the hemoglobin was 65 per cent.; red cells, 4,100,000; with a color index of 0.7.

Sutherland³ calls attention to the employment of *chloroform* in cases of anemia, and warns against its use. He had three cases die on the table, and the autopsy in every case showed death to be due to chloroform anesthesia. He has found ether anesthesia, and the ethyl chloride-ether sequence very satisfactory.

In the anemias of infancy Morse⁴ obtained good results with the subcutaneous injection of $\frac{3}{4}$ of a grain of an *aqueous solution of iron citrate* every other day. He suggests that the anemias, which seem like the chlorotic type, are not such, but have that appearance owing to the relatively low color index in infancy.

Klemperer⁵ says that it has long been known that *cholesterin* occurs

¹ American Medicine, April 1909, p. 204.

² British Medical Journal, 1909, vol. i, p. 209.

³ Intercolonial Journal of Australasia, vol. xiv, No. 1, p. 21.

⁴ Journal of the American Medical Association, July 10, 1909.

⁵ Berliner klinische Wochenschrift, December 28, 1908.

in bile, and that it occasionally leads to stone formation. Less weight has been placed on the fact that cholesterin is peculiar to every cell, not only of the body, but also of plant life. Cholesterin is taken with the food, absorbed by the intestines, incorporated in the cells, deposited by these into the blood, brought through the liver with the bile into the intestine, and reabsorbed. It has been proved that when the body cells die, the cholesterin becomes visible, so that much of what was formerly regarded as fatty degeneration is today looked on as the appearance of a lipid substance. In conditions of progressive destruction of the body cells, cholesterin circulates in increased amounts in the blood, so that a kind of lipoidemia exists. With the destruction of red blood cells, the bile is rich in cholesterin, and much of it appears in the feces.

The researches of previous investigators have proved that cholesterin will, under certain conditions, prevent hemolysis. It has not been proved however, that pernicious anemia is due to this cause. When hemolysis does occur, a hemoglobinemia and a hemoglobinuria must follow. Hemoglobin has never been found free in the blood serum. Urobilin has been found in the urine of patients suffering from pernicious anemia, but urobilinuria is also a sign of liver disturbance. The finding of hemosiderin in the liver after death from pernicious anemia is a proof that red blood cells have been destroyed, but not that they have been dissolved in the blood. It might be supposed that if cholesterin is anti-hemolytic, it would be found decreased in the blood in this disease. Klemperer estimated the cholesterin content of the blood of three cases of pernicious anemia, and found an average of 0.1575 gram per 100 c.c. of blood, whereas the normal is from 0.06 to 0.10 gram. In spite of this, he decided to try cholesterin. He determined to use one liter of cream and 200 grams of butter, instead of the too expensive and probably too strong 3 per cent. solution of cholesterin in oil. An analysis of this amount gives 2.19 grams cholesterin a day. Altogether 8 cases of typical pernicious anemia were treated, all being overseen by the hematologist. In addition to a mixed diet, as much butter, cream, and milk as the patient could take were given. The patients received small amounts of cognac, and powders of calcium carbonate and calcium phosphate, equal parts. If gastric disturbances occurred, the fat was lessened or withdrawn. Of these 8 patients, but 1 received fat alone; the other 7 were given arsenic because they were too ill to risk withdrawing it from the treatment. Klemperer was inclined to attribute this improvement to the medication, but he could not rid himself of the idea that, while cholesterin in no way specifically influences the course of the disease, it perhaps checks the poison just as an anti-katalytic substance, by its antagonistic action, performs its work.

He comes to the conclusion that, while the results are satisfactory, they are not sufficiently noteworthy to adopt cholesterin in place of arsenic. He discusses the mode of action of the latter, and asks, why,

if arsenic acts on the blood-making organs as it seems to do, larger amounts do not work better than smaller ones. He also advises that the theory of an infective agent be borne in mind. He calls attention to *kala azar*, which is accompanied by a profound anemia, and which is an infectious disease, and to the *trypanosoma*, which finally becomes resistant to large doses of arsenic.

Leukemia. The work on the subject of leukemia has not been very extensive during the past year; considerable interest, however, has been manifested in one type of the disease heretofore regarded as acute lymphatic leukemia, and in the nature and origin of the large ungranulated mononuclear cell characteristic of this disease, and probably found also in the splenomyelogenous type of leukemia.

Theoretically, Schultz¹ states that there are two forms of acute leukemia depending upon the origin of the cells predominating in the blood picture—the acute lymphoid, with the characteristic large ungranulated mononuclear cells, the latter originating probably from the lymphoid cells of the bone marrow; and the acute myeloid, with an increase in the blood of a cell very similar in appearance to, but originating from, the myelocytic cells of the bone marrow. The first type of cell, the lymphoblast, is probably the forerunner of the lymphocyte; while the latter, the myeloblast or leucoblast, represents the ancestor of the granulation cells, the myelocytes, and granular leukocytes. Whether these two ancestral forms have a common ancestor is as yet unsettled, and is a subject on which a vast amount of literature has been written.

The myeloblastic or leucoblastic cell is described by Buchanan² as a spherical cell with a large nucleus almost filling the cell, so that in some only a very thin rim of cytoplasm can be seen. The nucleus is finely reticulated, stains feebly, and may contain one or two small vesicular-looking nucleoli. The surrounding cytoplasm is finely reticulated, and with basic stains appears darker than the nucleus. The youngest variety has the basophilic cytoplasm stretched tightly around the nucleus. The latter, as the cell develops, becomes eccentric and reniform, the cytoplasm more abundant and less responsive to basic stains, thus appearing as a non-granular myelocyte in which the development of specific granulation will determine the class to which in future it will belong. These cells have in the past been looked upon as large lymphocytes with an origin from the lymphoid tissues. On the other hand, they probably represent a stage before the myelocyte.

Schultz states that while the differentiation between the chronic forms of leukemia is comparatively simple, and rests largely upon the finding of the lymphocytes in the blood of the one and the myelocytes in the blood of the other, the separation of the two acute forms is more

¹ *Münchener med. Woch.*, January 26, 1909.

² *The Blood in Health and Disease*, 1909, p. 130.

confusing and often very difficult, even post mortem. The differences between the two acute forms rests finally upon differences in the typical cells. Schridde previously pointed out certain differences in the internal nuclear structure and in the outer zone of protoplasm of the cells, but they were not striking enough to be of practical value. There has also been found in the myeloid cells, as well as in the granulated leukocytes and pus cells, a proteolytic ferment which is not found in the lymphoid structures. The method proposed by Jochmann and Müller for the determination of this reaction is cumbersome. Schultz, therefore, proposes a modification of a reaction originally used by Winkler for the detection of pus cells, which depends upon the presence of an oxidizing ferment in the myeloid cells and granulated leukocytes. A 1 per cent. solution of naphthol and a 1 per cent. watery solution of dimethyl-phenyl-endiamin (Merck) are freshly mixed in equal proportions, and the tissue or blood smear to be examined is placed therein. The cells belonging to the granulated family, including the ancestral form, the myeloblast, take on a distinct blue color, due to the action of the oxydase in these cells. He reports two cases with positive findings. The importance of the oxydase reaction is emphasized by Peters,¹ who reports the case of a woman, aged thirty years, who presented the picture of a large-celled leukemia, and in whose organs after death the test for oxydase was positive. The case thus belonged to the acute myeloid type.

Another point in the differentiation of these two types of cases has been brought out by Port². He calls attention to the fact that in the acute myeloid leukemia there appear in the blood not only the myeloblastic cells without granules, but also a slightly later cell—the premyelocyte—in which a few fine neutrophilic granules may be made out by either the triacid or the May-Grünwald stain. These cells are not found in the acute lymphoid type. Possibly also the findings of Ottenberg³ of Auer's rods in the cells in acute leukemia may prove of service in distinguishing the lymphoid type from the myeloid form. In 1903 Auer had observed certain peculiar bodies in the large lymphoid cells of three cases of acute leukemia. The granules, crescents, and rods which he described were seen in fresh blood, and in smears stained with various azure dyes or with the triacid mixture. The rods are found alone in the cell body of the large lymphocytes, generally singly, although two may be seen. Stained with Giemsa, or by Wright, or Hasting's methods, they are red, a trifle longer and more slender than the tubercle bacilli, and they may be nodular. The ends are generally tapering, but may be abrupt. They are indistinguishable from the azurophile granulations now recognized as occurring regularly in lymphocytes. They could not be culti-

¹ Münch. med. Woch., July 29, 1909.

² Deutsch. Arch. f. klin. Med., 1909, Band xevi, Heft 3 and 4.

³ Proceedings of the New York Pathological Society, February and March, 1909.

vated on ordinary media, nor could they produce pathological changes in monkeys (*Macaccus*).

As to the origin of the myeloblasts, Threadgold,¹ with others, believes that they come from the bone marrow. He states that after birth the bone marrow produces red corpuscles and all kinds of leukocytes, while the glands and spleen are concerned in the production of lymphocytes, some of which find their way into the blood. So in lymphosarcoma, lymphadenoma, and in other similar obscure conditions involving the glands and the spleen, the white cells of the blood are very seldom affected, while when the marrow is involved these cells become a marked characteristic of the disease. The leukemias are therefore to be regarded as having their origin in changes in the bone marrow, while the granulocytic deposits in the various organs are now regarded as outgrowths from the bone marrow. This view is further substantiated by a report by Herz.² His report also emphasizes the possible relation of infection in the etiology of leukemia. His one case is that of a patient who developed a fatal septicemia following an infection of the toe of the left foot. The blood examination several days before death showed hemoglobin, 100 per cent.; red corpuscles, 5,900,000; and the white cells, 16,800; the differential count gave polymorphonuclears, 6.7 per cent.; small lymphocytes, 1.4 per cent.; large lymphoid cells, 80 per cent.; transitional cells, 3.9 per cent.; no eosinophiles or basophiles; neutrophilic myelocytes, 8.07 per cent. The large lymphoid cells were similar to the cells described above, having a single large round nucleus faintly stained and surrounded by a small amount of protoplasm, which, as a rule, did not contain granules; in a few of the cells, however, a few neutrophilic granules could be noted.

The autopsy showed the case to be one of staphylococcic septicemia starting in the left foot, but with leukemic blood findings, and leukemic changes in the spleen and lymphatic glands. The bone marrow showed a diminution of the granulated white cells. The large cells found in the spleen, lymph glands, and blood were looked upon as myeloblasts, as has already been pointed out by Schultze, Meyer and Heineke, Fabian, Nägeli and Schatloff, Hirschfeld and Pappenheim. Reference is made to a similar case reported by Butterfield—a case of acute lymphatic leukemia in which the marrow was completely reactionless, and in which there were extra medullary overgrowths of myeloid cells in the spleen and lymph glands with the appearance of the myeloblast in the blood.

To further emphasize the influence of infective processes upon changes in the blood picture, he reports another case of a man, aged forty-four years, who died from a general septicemia following a gangrenous periostitis of the upper jaw. The blood count in this case showed a hemoglobin of 20 per cent.; erythrocytes, 850,000; and leukocytes, 880. The

¹ Quarterly Journal of Medicine, October, 1909.

² Wien. klin. Woch., April 8, 1909; Medical Press and Circular, August, 18, 1909.

red cells showed considerable variation in size; poikilocytes, slight polychromatophilia, and a few normoblasts. Only two polymorphonuclear leukocytes were found in one complete specimen. Almost all the cells were small lymphocytes, a few large mononuclear cells, and no eosinophiles, basophiles, or myelocytes.

In seeking an explanation for these changes, it seems evident that the red-cell apparatus and the leukocyte-forming organs are not affected in a similar manner. That the former is little damaged in these two cases is shown by the normal red cell count in the first case, and the presence of normoblasts in the second. In both, the regenerative power of the granulated white cells seems to have been affected, in the latter merely sufficient to cause disappearance of these cells from the blood-forming organs and the blood, while in the second case there was depression of the myeloid function of the bone marrow, which was followed by the assumption of this power by the tissues of the spleen and lymphatic glands with the production of early immatured cells—the myeloblasts which appeared in the blood. The infection is not to be looked upon as the direct etiological factor, but under its influence there was an alteration of the hematopoietic organs, by which the proper soil was formed for the development of the leukemia. This infectious origin of disturbances of the bone marrow is further illustrated in certain infectious diseases in which either myelocytes are found in the blood, or in which a myeloid change is found in parts of some of the blood-forming organs.

Threadgold,¹ however, states that infective processes play only a very indirect part in the causation of the various leukemias, because (1) the leukocytosis resulting in response to the presence of organisms is usually exclusively polymorphonuclear, although a lymphocytosis may occur; (2) the occurrence of eosinophile myelocytes, mast cells, and basophile myelocytes is excessively rare except in myelogenous leukemia; (3) the absence of an initial leukocytosis; (4) the fact that pus, formed in an intercurrent suppuration in leukemia, is made up almost exclusively of polymorphonuclear cells showing that leukemic cells, are of little use in repelling the attacks of ordinary germs; (5) the fact that leukemic blood injected into other patients or animals will not produce a leukocytosis or other change which could be explained as due to infection; (6) the fact that treatment by x -rays and Coley's fluid seem to do good in some cases by destroying some of the morbid cells and promoting fibrosis in the spleen and bone marrow; and finally (7) the repeated negative bacteriological findings, except where the septicemia was to be explained as a terminal condition. This evidence practically eliminates any infective origin of the disease. Threadgold looks upon leukemia as a variety of malignant disease with its origin in the bone marrow.

¹ Loc. cit.

The variety and severity of the affection varies with the part of the hemopoietic apparatus affected, with the intensity of the stimulus, and with the ability of the organism to resist it.

He gives a synopsis of 12 cases of lymphocythemia reported by Forbes and Longmead.¹ Marked anemia was present in every case. In 7 cases, the red cells were under 1,500,000 per c.mm. before death. In 6 cases under observation for a period of from four to six weeks there was a steady fall in the number of red cells during the later stages. Blood films from all cases showed an excessive number of non-granulated cells, both large and small. Glandular enlargement was absent in one case. In 4 cases the glands were slightly enlarged in some situations. In the other cases, glandular enlargement was more general, although never very marked. The liver was almost invariably enlarged. In all cases collections of lymphocytes were found underlying the capsule and in the connective tissue enclosing the portal canals. The spleen was usually enlarged, the pulp being congested and crowded with lymphocytes; these cells were more obvious around the Malpighian bodies investing the bloodvessels in the form of a sheath, pointing to an involvement of the perivascular lymphatics. In 9 out of the 12 cases, there was general lymphocytic invasion of the kidneys, most marked in the cortex, in some so extreme that very little normal tissue was left. Other cases of acute leukemia are reported by Eschbach and Bauer;² one by Rodler-Zipkin³ with generalized skin lesions, a condition found more frequently in pseudoleukemia; also a case of atypical myeloid leukemia with nodular infiltration of the skin, by Rolleston and Fox.⁴

CHLOROMA. The relation of chloroma to the acute forms of leukemia has already been mentioned⁵ in reviewing a report on this subject, by Threadgold. He⁶ now gives abstracts of 4 cases of chloroma reported since the appearance of his paper. These cases, he states, support the view that the bone marrow is primarily affected in chloroma, and that chloroma is closely allied to leukemia. All 4 cases seem to have originated in a proliferation of atypical cells, which normally produce myelocytes—the premyelocytes or myeloblasts. Clinically, all 4 cases showed, at some period of their course, a marked resemblance to acute leukemia. In one case the absolute number of polymorphonuclear cells in the blood remained about normal, suggesting a more local affection of the marrow than was present in the other cases. However, the marrow was extensively affected in all of them.

As we have pointed out that there are two forms of acute leukemia—

¹ Proc. Royal Soc. Med., 1908, Clin. Sec., 129.

² Arch. des. Malad. du Cœur, June 11, 1909.

³ Virchow's Archiv, Band cxcvii, p. 135.

⁴ British Journal of Dermatology, November 19, 1909.

⁵ PROGRESSIVE MEDICINE, June, 1909.

⁶ Quarterly Journal of Medicine, October, 1909.

the lymphoid and the myeloid—so are there two forms of chloroma, or, to use the term proposed by Nägeli, Fabian, and others,—chloroleukemia. Jacobæus¹ reports 2 cases of the myeloid form of chloroleukemia, to which he adds 8 cases from the literature. The symptoms consist of a progressive, often high-grade anemia, usually associated with a hemorrhagic diathesis, and gangrenous stomatitis. There is some enlargement of the lymphatic glands and the spleen, although not to the extent seen in the chronic form of leukemia. The difference between the two forms of chloroleukemia depends upon the blood changes and, in the lymphoid form, upon the presence of the peculiar tumor-like infiltrations in the orbits and other parts of the skull, with lesions of some of the cranial nerves by pressure of these tumors. In the 10 cases of myeloid leukemia reviewed, only 2 showed these tumor formations. They were, moreover, the only two occurring in childhood. From which it appears that the lymphoid form of chloroleukemia occurs chiefly in childhood, and has the local lesions in connection with the skull bones as one of its main characteristic signs, while the myeloid type occurs mostly between the ages of thirty and forty years and seldom shows these tumor growths.

The blood shows a more or less rapidly progressing anemia, often to an extreme degree, and associated with the presence in the blood of nucleated red cells—normoblasts and megaloblasts. The number of leukocytes is increased, up to from 26,000 to 300,000, with the general picture of a typical leukemia, but especially characterized by the presence of myelocytes or closely related myelocytic cells. These latter may make up from 50 to 95 per cent. of the cells, and are usually neutrophilic myelocytes, although the eosinophile type may predominate. Besides these cells, there are found large mononuclear cells without granules, to which various names and origins have been assigned. They are now regarded as myeloblasts by many investigators, a view to which Jacobæus subscribes. The polymorphonuclear cells are relatively reduced, and the lymphocytes as well, although the latter may be increased.

Another characteristic of this condition is the greenish discoloration of the lymphoid structures. This color seems to be a property or characteristic of the cells, and may be found in various organs where lymphoid infiltration has occurred. The tumors of the lymphoid form found in the orbit or skull, or, in fact, wherever spongy bone is present, also possess this peculiar green coloration. This characteristic has led some observers to place the disease in the class with the lymphosarcomata.

Various explanations have been suggested for this greenish coloration of the lymph glands, probably the most general one being that it is not a pigment, but a true cell color. This hardly seems satisfactory, for we should expect to find one particular cell affected, which has not been

¹ Deutsch. Archiv f. klin. Med., 1909, Band xeviii, Heft 1 and 2.

found to be the case. It represents, however, the main clinical difference between chloroleukemia and acute leukemia. The explanation for the color suggested above led Jacobaeus to look for the color in the leukocytes in centrifuged specimens of blood from his patients, and by this means he was able to make a diagnosis before death. In the treatment of the condition, the Röntgen rays have given marked improvement in some cases, while in others no change has been noticed.

SPLENOMYELOGENOUS OR MIXED LEUKEMIA. Very few reports have been made on this form of leukemia during the past year; of these, probably one of the most interesting is that recorded by Klieneberger¹ on the transition of chronic splenomyelogenous leukemia to the acute myeloblastic type. He says that a number of cases have been reported in literature in which a typical myelogenous leukemia has taken an atypical course. This consists largely in the presence of large mononuclear cells in the blood, with a partial or complete disappearance of the granulated cells. These cells are now looked upon as being myeloblasts, as described in the discussion of acute leukemia, and represent immature elements from the bone marrow, the parent cell of the myelocytes, and polymorphonuclear cells. Klieneberger reports the case of a man, aged forty-six years, who had been suffering for twenty years with symptoms of tabes dorsalis, and who later, in January 1906, developed the signs and symptoms of a typical splenomyelogenous leukemia. There was slight enlargement of the inguinal lymphatic glands; the liver was enlarged, and the spleen almost filled the left side of the abdomen. The hemoglobin was 70 per cent.; the red cells, 2,990,000; and the white cells, 309,500; the differential count of the latter showed polymorphonuclears, 55.8 per cent.; large lymphocytes or myeloblasts, 5.6 per cent.; small lymphocytes, 2.8 per cent.; mononuclears, 0.6 per cent.; transitionals, 0.2 per cent.; mast cells, 16 per cent.; eosinophiles, 1 per cent.; neutrophilic myelocytes, 17 per cent.; and eosinophilic myelocytes, 1 per cent.; there were also a few normoblasts, rather marked polychromatophilia, anisocytosis, and poikilocytosis. Under treatment with the α -rays, improvement took place in the general condition and in the blood. A relapse soon occurred, however, followed by a second period of improvement. In October, 1908, a second relapse occurred, which was associated with a marked change in the general blood picture. The hemoglobin now was 60 per cent.; the red cells, 4,400,000; and the white cells, 56,000; the differential count showed polymorphonuclears, 31 per cent.; large lymphocytes or myeloblasts, 42.3 per cent.; small lymphocytes, 1.3 per cent.; mononuclears, 0; transitionals, 3 per cent.; mast cells, 5 per cent.; eosinophiles, 0; and neutrophilic myeloblasts, 16 per cent.; the myeloblasts later rose to 78 per cent. of a total white count of 305,000. At the autopsy the bone marrow and many of the

¹ Deutsch. med. Woch., December 9, 1909.

organs showed the presence of these large mononuclear ungranulated cells similar to those found in the blood. The possibility of this change should be borne in mind in the treatment of chronic leukemia by the α -rays, and treatment should not be persisted in too long in those cases which prove to be refractory to the effect of the rays. Such treatment should be stopped as soon as myeloblasts appear in the blood in any great numbers.

Another case, reported by Herz,¹ also emphasizes the close relationship between the different forms of leukemia, and, being an example of true mixed leukemia, may be discussed here. The patient was a woman, aged twenty-three years, who, on March 13, 1909, complained of fever, and bleeding from the gums, nose, genitalia, and into the subcutaneous tissue. On April 3, 1909, the temperature was 30.5° C; there was marked pallor, the glands of the neck were enlarged, though those of the axilla and groin were not palpable, while the spleen was slightly enlarged. The following day the blood showed hemoglobin, 32 per cent.; red cells, 1,225,000; and white cells, 51,000; the differential count showed polymorphonuclears, 1.6 per cent.; small lymphocytes, 36.3 per cent.; large lymphoid cells, 45.3 per cent.; neutrophilic myelocytes, 4.8 per cent.; transitionals, 2.6 per cent.; broken cells, 9.2 per cent.; no eosinophiles or basophiles. On April 6 the blood examination showed hemoglobin, 10 per cent.; red cells, 1,010,000; white cells, 110,000; a differential count of which gave polymorphonuclears, 8 per cent.; small lymphocytes, 21.1 per cent.; large lymphoid cells, 53.8 per cent.; neutrophilic myelocytes, 15.9 per cent.; transitionals, 1.7 per cent.; broken cells, 6.5 per cent.; no eosinophiles or basophiles. From these findings a diagnosis of acute myeloid leukemia was made; the patient died on April 7. At the autopsy the lymph glands showed a picture similar to that found in chronic lymphatic leukemia—an increase in the small lymphocytes. Besides the increased lymphocytes, there were groups of large mononuclear cells in some glands—some with granules and some without. The bone marrow showed a growth of myeloid tissue, consisting of neutrophilic myelocytes and ungranulated myeloblasts, with masses of cells having all the characteristics of small lymphocytes. Eosinophile cells and erythroblasts were present in small numbers. The spleen showed typical myeloid changes in the pulp, with narrowing of the still recognizable but small follicles. The final diagnosis, then, was a lymphatic leukemia with myeloid changes—a true mixed leukemia.

That chronic leukemia is closely related to various forms of malignant disease is shown by Harris.² He discusses the following diseases in their relation to malignancy: Lymphosarcoma, leukosarcoma, chronic lymphatic leukemia, chloroma, Hodgkin's disease and other forms of pseudo-

¹ Wiener klin. Woch., July 22, 1909.

² California State Journal of Medicine, March, 1909.

leukemia, chronic myelocytic leukemia, and myeloma. He thinks that the presence of an increased number of white cells, in some of these conditions, has diverted attention from the true nature of the disease.

Leclerc¹ reports a case of leukemia in a man, aged fifty-five years, who had been subject to gout for some time and had been voiding gravel and at times calculi. The leukemia had persisted for two years and was of the myeloid type, with predominance of the polymorphonuclears over the myelocytes. Leclerc has found only three similar cases on record. He thinks that there is probably more than a mere casual coincidence between the leukemia and the renal lithiasis, as recent research has revealed the part played by the leukocytes in the production of uric acid. In three of the four cases, there were no signs of kidney stones until after the onset of the leukemia.

The usual age for leukemia to appear is during youth or adult life, although it may occur at the extremes of life. For instance, Babonneix and Tixier² summarize from the literature 4 cases of congenital leukemia; 13 cases of lymphatic leukemia, including one from their own experience; 8 of myeloid and 3 of atypical leukemia, all in infants, some of whom were breast fed. The disease developed between the first and second years in 13 of the 21 cases, the majority being in males. Death occurred within a few days in some cases. No treatment has been found to be effectual, although no record could be found of Röntgen ray treatment having been tried.

In contrast with these, Smith³ reports 3 cases of leukemia occurring in patients between the ages of sixty and seventy years. These cases are also interesting in that two of them were in women who had lived in luxury since birth, while the disease is usually seen more frequently in men.

Webster⁴ holds that leukemia is not a disease, but merely one symptom of a general disturbance. He reports the case of a woman who was the subject of a syphilitic infection, and who, at one time, showed 16 per cent. of myelocytes in a white blood count of 20,000, so that a diagnosis of splenomyelogenous leukemia was therefore suggested. Later, under treatment, there resulted a slight reduction of the total count to 18,200, while the presence of 50 per cent. of lymphocytes made the diagnosis of lymphatic leukemia seem reasonable. A continuation of the specific treatment caused the blood to return to normal.

Another case of interest, because of a high white count, was one reported by Placak.⁵ A woman, aged thirty years, complained of becoming weak or fatigued upon the slightest exertion, with marked dyspnea and

¹ Lyon Medical, January 10, 1909.

² Arch. de Méd. des Enfants, September, 1909.

³ Medical Record, January 30, 1909.

⁴ New York State Journal of Medicine, July, 1909.

⁵ Journal of the American Medical Association, December 11, 1909.

slight hemorrhage from the mouth. The spleen was enlarged, but there was no enlargement of the glands. The hemoglobin varied from 40 to 25 per cent., increasing for a time upon the administration of iron and arsenic; red cells varied from 1,250,000 to 2,250,000. The interesting feature of the case was the enormous leukocytosis, 1,820,000, which persisted for a few weeks. Differential counts showed as high as 27 per cent. of myelocytes. Shortly before death the superficial lymphatic glands became enlarged.

LEUKANEMIA. Among the cases of so-called splenic anemia,¹ certain cases are met with in which, with anemia, enlargement of the spleen, and no increase in the leukocytes, there are marked qualitative changes in both the red and white corpuscles, which suggest the changes in pernicious anemia and in leukemia. The term leukanemia, therefore, was coined by Leube and adopted by Weber in 1904. The characteristics of the condition are progressive anemia and asthenia, with maintenance of the subcutaneous fat; changes in the red corpuscles rather similar to but not so extreme as those met with in true pernicious anemia; absence of true leukemic changes in the blood, but the presence of a slight myelocythemia and an inverted proportion of lymphocytes and polymorphonuclears. Melland reports the case of a girl, aged twelve years and eight months, who was first seen because of pain in the epigastrium and swelling in the upper part of the abdomen. When she returned a month later a tumor was noted in the lower part of the abdomen, which later proved to be the spleen. Examination showed rather marked pallor, besides the splenic enlargement, a temperature of 102.6°, and no enlargement of the superficial lymphatic glands. The blood examination showed hemoglobin, 26 per cent.; red corpuscles, 1,265,000; white cells, 2600; a differential count of the latter gave polymorphonuclears, 32 per cent.; small lymphocytes, 47.2 per cent.; large lymphocytes, 9.2 per cent.; large mononuclears, 7.6 per cent.; eosinophiles, 0.2 per cent.; basophiles, 0.2 per cent.; and neutrophilic myelocytes, 3.6 per cent.; 119 nucleated red cells were seen, of which, 19 were microblasts, 58 normoblasts, 13 megaloblasts, 23 intermediary forms, 4 free nuclei, and 2 metrocytes. The hemoglobin and red cells increased and the general condition improved under treatment, largely with arsenic, although the spleen continued to enlarge. The myelocytes and nucleated red cells increased, petechia appeared over the body, and there was an increase in the total number of leukocytes limited solely to the lymphocytes. The latter were of the lymphoid type, not from the lymphatic glands, but originating from the bone marrow from either the lymphoid cells preëxisting there, or by a morbid return of the myelocytes to a more primitive or embryonic phase in which they are unable to carry their differentiation to the development of granules in the protoplasm. These cells are similar to

¹ Melland, *Quarterly Journal of Medicine*, October, 1909.

the cells described in the discussion of acute leukemia. A return to arsenic again effected some improvement, which was, however, only temporary. Enlargement of the glands of the neck and the left axilla was now noted, and from this time on the course of the disease was downward despite any form of treatment. The last blood count showed hemoglobin, 31 per cent.; red cells, 1,260,000; leukocytes, 24,200; and the differential count gave polymorphonuclears, 13.2 per cent.; small lymphocytes, 55.8 per cent.; large lymphoid cells, 24.2 per cent.; large mononuclears, 2.2 per cent.; myelocytes, 4.2 per cent.; eosinophiles, 0.4 per cent.; and basophiles, 0. Melland agrees with Drysdale that the condition is one of atypical leukemia, and does not think that differentiation from true leukemia is necessary. The treatment is unsatisfactory, although arsenic seemed to do good in this case.

LYMPHATIC LEUKEMIA. The so-called acute lymphatic leukemia has been already referred to. With the exception of these reports, there has been no noteworthy contribution upon this subject for the last year.

TREATMENT. Especial stress is placed on the *x-ray treatment* of leukemia as giving probably the best results of any treatment thus far proposed. The method proposed by Pancoast and myself some time ago has continued to give good results. Briefly, this method consists in mapping out the bone marrow of the body into about eight districts or regions, and of exposing these consecutively and in rotation, repeating until desired results are obtained. Cases of the splenomyelogenous type seem to give the best results, although improvement has also been noted in the chronic lymphatic type. The acute forms seem to be unaffected, or sometimes even made worse. Levison and Dachther¹ report a case of chronic lymphatic leukemia treated by this method. The symptoms and signs were characteristic and extensive. The blood on December 30, 1907, showed hemoglobin, 25 per cent.; red cells, 1,688,000; and white cells, 342,000; the differential count gave 85.5 per cent. of lymphocytes, 10 per cent. polymorphonuclears, 2.5 per cent. large mononuclears, 1 per cent. eosinophiles, and 1 per cent. mast cells. After treatment, there was a remarkable improvement in the general condition. The splenic tumor and the glandular enlargement practically disappeared; strength returned, and the patient felt quite well. A lymphocytosis still persisted so that the cure was not complete. The blood, on November 22, 1908, showed hemoglobin, 96 per cent.; red cells, 3,936,000; white cells, 40,200; the differential count gave 80.6 per cent. lymphocytes, 15.6 per cent. polymorphonuclears, 3.3 per cent. large mononuclears, 0 eosinophiles, and 0.3 per cent. mast cells.

Cutler² reports a case of myelogenous leukemia which had been under

¹ Journal of the American Medical Association, March 6, 1909.

² Medical Record, May 29, 1909.

careful observation for some time. It is of interest in this discussion because of the marked improvement in the condition of the blood, and in the reduction of the size of the spleen without improvement in the general condition. The case also showed considerable temporary improvement, especially in the size of the spleen and the general condition of the patient, *after a severe hemorrhage*. There was practically no beneficial effect from any course of treatment or diet in the course of the disease. Another point of interest is that all through the disease there was an entire absence of any spontaneous hemorrhage or diapedesis until within a few hours of his death, when hemorrhage occurred into the left occipital lobe of the cerebrum, into both lobes of the cerebellum, and into the stomach. At no time were the bones enlarged or tender.

Elischer and Engel¹ report 44 cases of leukemia, lymphosarcoma, and mediastinal tumors treated with the *Röntgen rays* since 1904. They emphasize the importance of their early application in the treatment of all of these conditions. Later, much more extensive treatment becomes necessary, with all its inherent dangers. They state that it is impossible to foretell whether enlarged lymph glands in the neck will develop into one or the other of these conditions, and, as Röntgen rays have a beneficial action in all, they advise early and vigorous treatment without waiting for differentiation. In leukemia, the early commencement of treatment is even more important, and, in the latter stages, the exposures must be made with great caution. At first short exposures are made in order to avoid inducing radiotoxic symptoms, and especially to avoid injuring the sensitive capsule of the spleen. After eight or ten exposures they suspend treatment for a week, but supervise the patient's blood and weight. The radiotherapy should be supplemented with hygienic-dietetic measures. The patient must also be kept under supervision until later and treatment resumed at the first sign of recurrence, even if only objective. The main point in the treatment of leukemia is to use as little of the rays as possible, utilizing the late action of the rays. In many cases, however, notwithstanding great improvement, the danger of acute exacerbations seems to be made more imminent by radiotherapy. In one case six courses of radiotreatment were given in less than four years, and always with marked benefit, but there is no case on record of actual permanent recovery. The tissues seem, in time, to become immune to the action of the rays, which thus lose their influence. Of the 19 cases of leukemia, 10 of the 13 myeloid and two of the 6 lymphoid patients were very much benefited by the treatment.

The Röntgen ray treatment, according to Vas,² has a similar action on the metabolic processes in both lymphatic and splenomyelogenous leukemia. Under its influence, the purin bodies are increased, but not to parallel the numerical fluctuations in the leukocytes.

¹ Zeitschr. f. klin. Medizin, lxxvii, Nos. 1 to 3.

² Ibid., May 15, 1909.

Baldauf¹ suggests the *injection of bacterial toxins* in the treatment of leukemia. Longcope previously demonstrated that the bone marrow shows certain changes after infections, and Dock has emphasized the fact that certain cases of leukemia show marked improvement under similar conditions. Larrabee has also reported work with Coley's fluid, on the ground that leukemia was the result of a lymphosarcoma. He found that only cases of the splenomyelogenous type were improved. Dock pointed out, however, that both varieties might show improvement after infections. These various facts led Baldauf to try the method of injection of bacterial toxins in two cases of lymphatic leukemia and in one case of splenomyelogenous leukemia. In the former there was no change, while the latter showed considerable improvement. This form of treatment may be of benefit when the *x-rays* are not available or when other treatment fails.

Four cases are reported by Thomas,² and are of considerable interest because they were cured by *operative measures*. They will be referred to briefly.

CASE I.—A male, aged thirty-eight years, with symptoms of appendicitis dating back over six months. The blood showed hemoglobin, 60 per cent.; red cells, 3,000,000; and white cells, 350,000. "Differential examination showed a marked increase in the polymorphonuclear and eosinophile cells, and the presence of mast cells and myelocytes in great numbers." A gangrenous appendix was removed, and at the operation marked adhesions to the enlarged spleen were freed. The blood count on the second day after operation showed the white cells, 100,000; and on the twentieth day normal numbers of white cells, with the red cells 3,500,000, and hemoglobin 75 per cent. Recovery was complete with normal blood fourteen months later.

CASE II.—A female, aged thirty-six years. She had suffered from swelling of the abdomen for one and one-half years, with attacks of nausea and vomiting followed by diarrhea. The blood examination showed hemoglobin, 50 per cent.; red cells, 3,000,000; and white cells, 400,000. "The white formula showed an increase in the eosinophile cells and the presence of myelocytes and mast cells." At the operation some ascitic fluid was removed along with a cystic ovary the size of an orange. The spleen was found to be enlarged and adherent. On the twelfth day after operation the hemoglobin was 70 per cent.; the red cells, 3,500,000; and the white cells, 60,000. The symptoms disappeared during the next six months, and the patient was in good health two years later.

CASE III.—A female, aged thirty-two years, who for eight months had had attacks of epistaxis and hematemesis, with enlargement of the abdomen. The blood examination showed hemoglobin, 65 per cent.;

¹ St. Louis Medical Review, April, 1909.

² Northwest Medicine, May, 1909.

red cells, 4,000,000; and white cells, 450,000. Medical treatment was unavailing, and the reaction to the x -rays was so severe that this method had to be abandoned. The white cells later increased to 600,000. At the operation some ascitic fluid was removed and dense adhesions to the spleen were freed. Blood examination was later refused, but there was a complete recovery symptomatically.

CASE IV.—The patient was emaciated and weak, and had marked abdominal distention. The blood showed hemoglobin, 65 per cent.; red cells, 4,000,000; and white cells, 1,360,000. At the operation an enlarged densely adherent spleen was found and freed. Recovery was uneventful. The patient was alive two years later and free of symptoms.

Perisplenitis may act by disturbing the function of the spleen so as to destroy the reaction between that organ and the bone marrow.

ADDISON'S DISEASE.

With the increased interest during the past year in the subject of internal secretions, the ductless glands have formed the basis for considerable study. Of these glands, probably none have excited more interest than those which have been regarded as responsible, under certain pathological changes, for the syndrome of symptoms originally described by Addison.

Etiology. According to Addison's report, this condition was supposed to be due to disease of the suprarenal glands, usually of a tuberculous nature. Later investigators found that other conditions than tuberculosis might cause degenerative or other changes in these structures, which were followed by the symptoms described by Addison. Still more recently, the cause of the disease has been even further enlarged to include the sympathetic system along with the suprarenal capsules.

Leonardi¹ reports the clinical and autopsy findings in three cases; he noted that the morbid changes in the suprarenals were accompanied by changes in the other glands with an internal secretion—the thyroid, hypophysis, and spleen; in these there was evidence of hypertrophy with hyperfunctioning. In one patient the first symptom was tremor of the arms, probably the result of exposure to electric currents, the man's work being done under an electric light of between 15,000 and 20,000 candle power. The effect of the Röntgen rays upon glandular organs suggests that the light may have affected the cervical sympathetic, the thyroid, and the hypophysis. Later, the process seems to have extended to the abdominal sympathetics and the suprarenals. In another case, early atrophy of the ovaries followed pregnancy, bringing about premature menopause. Calcareous degeneration of the thyroid fol-

¹ Il Policlinico, August, 1909.

lowed, with tuberculous infection later and fulminating suprarenal symptoms. The diseased suprarenals could not obtain help from the ovaries or thyroid, and there was merely slight hyperfunctioning of the hypophysis as a defensive reaction. All three patients recovered their energy late in their disease, and the bronzing subsided under thyroid treatment. Leonardi states that the course, outcome, and histological findings of the disease, together with the research in the experimental field, all sustain the assumption that Addison's disease, in its complete form, is a general affection of the entire sympathetic system.

According to Sergent,¹ the syndrome of suprarenal insufficiency may be slow or acute. In the chronic form, of which Addison's disease is the extreme type, the tuberculous process in the suprarenals is almost always primary, these glands being rarely affected secondarily, even when there is advanced tuberculosis in other organs. The weakness, the low blood pressure, the loss of appetite, the constipation, vomiting, anemia, and progressive emaciation, especially if occurring without bronzing, may suggest pernicious anemia, leukemia, or latent cancer. In some of these cases, the bronzing may be rendered manifest by application of a mustard plaster, which draws the pigment to the surface.

The acute form of suprarenal insufficiency is attracting considerable interest at the present time, and its brief mention may not be out of place. According to Sergent, it may simulate a fulminating poison, peritonitis, meningitis, apoplectiform coma, etc., and it may be suspected when the febrile and other phenomena of an infectious disease are suddenly supplemented by signs of depression, small unstable pulse, subnormal temperature and arterial tension. The "White line" is pathognomonic of suprarenal insufficiency, and may prove very helpful in arriving at a diagnosis, especially in these acute types. It is produced by drawing the finger lightly along the skin of the abdomen; in a few seconds a white stripe appears, growing more and more distinct, remaining stationary for three or four minutes, then disappearing. Besides trauma, an operation or even pregnancy may bring on this acute insufficiency of the glands.

Lewis² reports a case with typical symptoms, in which, at autopsy, the suprarenals were found to be the site of several large, irregular, firm white tumors, nodular in character. The cut surface showed necrotic and hemorrhagic areas, with none of the normal tissue remaining. There was a round-cell infiltration, but without the formation of distinct tubercles. There was also a degeneration of the cells of the sympathetic ganglia, caused probably by pressure of the enlarged lymph glands. This finding is of considerable interest in connection with Leonardi's view stated above as to the involvement of the sympathetic system.

Symptoms. These include the weak heart and pulse, with low blood pressure, discolorations of the skin and mucous membranes, great

¹ *Presse Médicale*, July 10, 1909.

² *Medical Record*, January 9, 1909.

muscular debility, gastric and intestinal irritation, and anemia. White¹ refers to two cases of Addison's disease with rather unusual distribution of the pigmentation; the one, a woman aged thirty-seven years, showed a pigmentation on the face, arms, and chest, the color being especially dark on the nipples, axillæ, and tongue. The other, a girl, aged seventeen years, had the pigmentation in the usual situations, but especially marked on the nipples and finger nails.

Aside from the well-marked cases, certain borderline cases are met with in which a diagnosis of Addison's disease is suggested. McKendrick² reports such a case. A woman, aged thirty-seven years, complained of cough with expectoration and general weakness. There was a very striking pigmentation of the skin, a yellowish-brown color affecting chiefly the forehead, neck, hypochondriac and abdominal regions in front, and the infrascapular and lumbar regions behind. The arms were also uniformly pigmented from the shoulders to the metacarpophalangeal joints. The pigment was wanting on the legs and thighs, and over the clavicular and mammary regions in front, and the suprascapular regions behind. Within the pigmented areas were patches of clear pearly skin,—leukodermia. There were signs of consolidation over the left apex, the lungs otherwise being normal. The symptoms, in their order of development, were pigmentation of the skin followed about a year later by great weakness and breathlessness, cough with expectoration, anemia, and, lastly, a tendency to diarrhea. The question arises as to whether, from the symptoms of pigmentation, asthenia, gastro-enteritis, tuberculosis, and splenic enlargement with normal blood count, one is justified in supposing (without postmortem examination) that this patient suffered from Addison's disease. Or was the tuberculosis primary, and the other symptoms secondary manifestations of this toxic process. Also, is leukodermia a frequent accompaniment of the Addisonian pigmentations.

White³ speaks of the differential diagnosis of this disease, especially in reference to the pigmentation. There must be eliminated (1) the pigmentation of pernicious anemia, in which the skin has a lemon tint, while the mucous membranes are not affected, and the blood picture is characteristic; (2) arsenical pigmentation, which never appears on the mucous membranes; (3) pigmentation due to malignant disease, tuberculosis, syphilis, Hanot's cirrhosis of the liver, and that found in the so-called bronzed diabetes.

Wolf and Thatcher⁴ discuss the protein metabolism in Addison's disease. They found a normal capacity to reduce amid nitrogen and to transform the sulphur of the cystin group into sulphuric acid, while the output of kreatinin and uric acid was below that of normal subjects.

¹ Practitioner, February, 1909.

² Glasgow Medical Journal, June, 1909.

³ Loc. cit.

⁴ Archives of Internal Medicine, June, 1909.

Capezzuoli¹ reports metabolic findings in Addison's disease under suprarenal treatment.

Straub² reports a case of acute Addison's disease after thrombosis of both suprarenal veins in a patient with gastric ulcer.

Treatment. This should in the first place have as its aim the prevention of the development of the acute phase of the disease. These patients should avoid exertions, contact with infectious processes, and should refrain from toxic drugs, especially arsenic, which is a violent poison in cases of suprarenal insufficiency. Good results have followed the administration of phosphates, and especially of lecithin. Antisyphilitic treatment should be used carefully when a syphilitic origin is suspected, although the mercury and iodide are liable to prove poisonous for the suprarenal capsule. Suprarenal organotherapy is useful both for differentiation and cure, the entire subsidence of the Addison syndrome having been seen under its use. Fresh glands from young calves may be used, the patient ingesting from 1.5 to 2 grams a day, up to 5 grams, or the dry extract may be taken. This is kept up for from ten to twelve days, suspended for two or three days, and then recommenced. He prefers the extract of the whole gland, although he sometimes uses adrenalin. He has found this particularly useful in infectious diseases when he suspected suprarenal involvement. The usual dose is 0.001 gram a day, but up to 0.006 gram may be given in 6 doses, and this kept up for two months.

Sajous³ points out, after an analysis of 120 cases, that a number of patients die suddenly after ceasing the suprarenal preparations after apparent recovery. It is evident that the lost or degenerated tissue of the gland cannot be replaced, so that when the active substance is withdrawn collapse occurs. Grafting of the gland should give good results, provided only small fragments were inserted and gradually increased in number until the temperature and pulse rate indicate that compensation has taken place.

OBESITY.

The present ideas on this subject were briefly summarized by von Noorden, at the Sixteenth International Medical Congress at Budapest, as follows⁴: In the common form, obesity is due either to overfeeding or lack of exercise, frequently to a combination of these two factors. There are other cases to which neither of these conditions seem to apply, and yet in which obesity develops. It is now generally agreed that, in

¹ *Il Policlinico*, June 6, 1909.

² *Archiv für klin. Med.*, vol. xcvi, Nos. 1 and 2.

³ *Monthly Cyclopedia and Medical Bulletin*, April, 1909.

⁴ Abstract, *Journal of the American Medical Association*, October 9, 1909.

these cases, the oxidation power of the organism has become weakened; this in turn has a direct relationship with the thyroid gland, temporary changes in which raise or depress the power of oxidation. He classifies the various *forms of constitutional obesity* as follows: (a) Primary thyreo-genic obesity, dependent upon actual changes in the thyroid, such as atrophy, degeneration, functional weakness, etc.; (b) secondary thyreo-genic obesity, dependent upon functional disturbances of the thyroid on the action of other organs, such as the pancreas, hypophysis cerebri, suprarenals, thymus, pineal gland, and perhaps other organs which are influenced through the agency of an internal secretion.

Pariser¹ has for years been carrying out the *thyroid treatment of obesity* upon the belief that endogenous obesity is of thyroid origin. He describes the first case, which drew his attention to this relation: A woman, aged twenty-five years, with extreme obesity developing soon after panhysterectomy, had taken ovarian tablets perseveringly but without the slightest effect. She began to improve, however, when treatment with a thyroid preparation was instituted. This, and other similar experiences, has led him to the belief that the thyroid is a secondary sexual gland, like the mammary gland, and that constitutional endogenous obesity may result from thyroid incompetency. It, moreover, has many points in common with myxedema, which may be regarded as the last offshoot, an aberrant type of constitutional obesity. The lack of success with dietetic measures and the small size of the thyroid gland may suggest this form of obesity, an assumption, which is confirmed by the results of extremely mild thyroid treatment, increasing from 0.1 gram to 0.3 gram of gland substance in tablet form in the course of three weeks, and then reducing it again, with a free interval at the end of the month. In this way he has never had any bad effects. If polyuria should develop, he would regard it as a sign that the dose was too high or the intervals too short. The most reliable index of cumulative action is the pulse; if this runs up to 100 or 110, the extract should be discontinued and rest imposed. An occasional suspension of the thyroid courses for six or eight weeks is advised, but, as the aim is to supply a physiological deficiency, the extract must be supplied again as the deficiency makes itself felt. He generally combines dietary measures with the thyroid treatment, as the endogenous form is frequently mixed with the exogenous form.

Kisch² lays down the rule that the fatter the organism, the less the amount of albumin required in proportion. He does not believe in overloading the obese with bulky salads, apples, potatoes, etc., on account of the tendency to dyspepsia, but relies especially upon exercise for reducing the weight.

In the obesity resulting from constitutional causes, either congenital

¹ Med. Klin., August 15, 1909.

² Therapie der Gegenwart, April, 1909.

or acquired as the result of some pathological process, the aim should be to improve the blood production and influence the cellular processes. Iron is useful, and the diet should be regulated to supply plenty of albumin, while avoiding substances that produce fat. The intake of fluids should be regulated by the amount of diuresis; exercise should be taken very cautiously in order not to fatigue the easily exhausted heart.

Hedinger¹ gives the metabolic findings in five persons restricted to less than a quart of milk a day, the *Karell cure*, advocated in the treatment of obesity. On account of the marked deficit in nitrogen and the retention of salt, Hedinger is of the opinion that a more rational method of underfeeding might be found, one which, with the same small number of calories, would still supply sufficient albumin and would maintain the nitrogen balance undisturbed. He suggests the *Rosenfeld-Richter potato diet* as a possibility. Rosenfeld² introduced this form of diet four years ago. He now reports continued success with it in the treatment of obesity. The main features of the diet are, the supplying of the necessary amount of albumin for the demand of the body, and the prohibition of fat; the diet is scanty in calories, but with plenty of carbohydrates, especially in the form of potato with large amounts of cold water, best combined with rest in bed and frequent meals. The feeling of satiety depends upon the filling of the stomach, and it seems to be immaterial to the stomach with what it is filled; the food here should fill the stomach, but should supply merely small amounts of nourishing substances. Potato, water, and soups fulfil these requirements, and aid in reducing the fat. Small, frequent meals are advised to prevent the development of a too hearty appetite; the latter is also aided by repose, especially rest in bed. If properly carried out, the patients do not seem to feel the restrictions and so do not become nervous and irritable. Occasionally backache is complained of, probably due to the change in attitude of the spine as the abdomen loses its fat. The reduction of weight upon this diet is from the loss of actual fat. It may take six months to bring the patient down to his normal weight, and it is suggested that this diet be kept up a few days each week to maintain the benefit.

Mere mention might also be made of Bergonié's³ work with the *alternating electric current* in the treatment of this disease. He states that all methods of treatment for obesity rest upon the diminution of food and increasing elimination. The latter is often difficult, owing to the depleted nervous system. Bergonié has met the difficulty by artificially obtaining intense muscular activity, by causing an alternating current, 40 to 100 per second, of 8 to 12 volts and of an intensity of 50 milliamperes to pass through the body. There is no pain. Under the influence of the current all the important muscles are animated with strong

¹ Deutsch. Archiv f. klin. Med., June 12, 1909.

² Archiv f. Verdauungs-krankheiten, June, 1909.

³ Paris letter, Journal American Medical Association, October 9, 1909.

muscular contractions. According to the reporter's experience, the treatment will cause a very rapid diminution of weight if the patient is also careful to maintain his diet at a ratio below that which corresponds to his muscular outlay; it will, moreover, increase strength and resistance to fatigue.

MYXEDEMA.

While much of the work on the thyroid recorded during the past year has dealt with the results of hyperactivity of the gland, there has appeared little on the condition of hypothyroidism or athyroidism. The partial forms have been creating some interest, as they are seen in either myxedema or cretinism.

Pitfield,¹ in a report of two cases of myxedema, states that the term myxedema is not a good one, and prefers the designation *hypothyroidea*. He also questions whether the disease should not be classified among the nervous diseases, as so many of the symptoms are closely related to the nervous system.

Rankin² discusses the complete form of myxedema under its two types—that seen in adults and that seen in children (*cretinism*). Taking up the first, he says the average age of incidence is between thirty and fifty years, females being more frequently attacked than males. While heredity may be a factor in its etiology, the immediate cause of the disease is the mechanical removal of, or morbid change in, the thyroid gland; the nature of this morbid change, however, is unknown; it may be inflammatory or toxemic. The onset is insidious, but, when the condition is fully developed, the personal appearance and mental dullness of the patient are very characteristic. Briefly, the bulk of the body becomes gradually increased by subcutaneous edema, which, however, will not gravitate to dependent parts or pit upon pressure. The increase in size is accompanied by nutritive changes in the skin and mucous membranes, by mental obtuseness, and by a peculiar and characteristic drawling speech. The only two disorders with which confusion might arise are chronic Bright's disease and acromegaly. In the former the edema is fluid, the skin pits on pressure, and albuminuria is marked; while in the latter the swelling is mostly confined to the face and extremities.

When myxedema is caused by the congenital absence or abnormality of the thyroid gland, there is added to the symptoms of myxedema the lack of mental or physical development. There is usually an absence of symptoms until toward the end of the second year, when it is noted that the child is stunted in growth and is not thriving. The symptoms develop gradually, and are manifested by the short fat neck, the protuberant abdomen, the thick and everted lips, the swollen features, the

¹ American Journal of the Medical Sciences, July, 1909.

² Practitioner, February, 1909.

short, broad, tilted nose, and dull, stupid expression. The skin is harsh and dry, and the hair short, lustreless, and broken. The mucous membranes are thickened and the subcutaneous tissue is in a condition of solid edema. The head is small, misshapen, and droops forward on the chest, the legs are short and bowed, and the spine frequently has a marked anterior curvature. The child does not stand erect, the mouth is open, and from it protrudes the swollen tongue with the decayed and poorly developed teeth showing. The talking consists of a series of grunts; the child is irritable, passionate, destructive, dirty in his habits, and mentally dead.

Levy, Rothschild, and Huchard¹ discuss thyroid instability as applied to a series of morbid conditions between the two extremes of myxedema and exophthalmic goitre. These patients show symptoms of deficient and of excessive thyroid function. The authors also call attention to a special paroxysmal form of thyroid instability. This comprises such conditions as migraine, periodical vomiting, asthma, urticaria, eczema, attacks of mucomembranous enteritis and of chronic rheumatism. These syndromes are met with in persons with pronounced thyroid instability, and are relieved by thyroid therapy. Thyroid ingestion, on the other hand, is capable of producing these symptoms. In true myxedema there is no power of reaction, so that these symptoms, instead of being paroxysmal, are continuous.

Concetti² ascribes to thyroid insufficiency many of the phenomena noted in young infants, such as a tendency to obesity, transient edema, cold feet and hands, scanty and brittle hair, vasomotor disturbances, vomiting, somnolency, and slight resistance to infections. These are often more pronounced with artificial feeding, and to them then may be added eczema, etc. He has noted symptoms of hypothyroidism in the infant following derangement in the thyroid function of the mother or wet-nurse. He has also shown, by experimental work upon goats, that the thyroid secretion can be transmitted by the placenta and the milk. He thinks that, in many cases, the condition of thyroid insufficiency in infants is overlooked. In some cases, the infants seem to be suffering from excessive thyroid function, or the deficiency and excess may alternate. All of these cases show notable improvement under correct thyroid treatment.

Levi³ calls attention to the similarity between many of the changes occurring in senility and those of myxedema, and to the fact that thyroid treatment given in old age and watched carefully should be beneficial.

Partial Myxedema. While the complete and fully developed cases of myxedema are comparatively rare now that cases of thyroid insufficiency are recognized earlier and treatment instituted, the milder forms, or the

¹ Bull. de l'Académie de Méd., May 18, 1909.

² Annales de Méd. et Chir. Infant., August 15, 1909.

³ Journal de Méd. de Paris, 1909, No. 26.

cases of partial myxedema, are more frequently encountered. Reports of such cases are therefore of considerable interest.

While typical complete forms are rare, the *formes frustes* are encountered frequently. Nichols¹ discusses partial myxedema at some length, and reports a case of the adult type. It now seems well established, in spite of various opinions to the contrary, that partial myxedema does exist as a distinct disorder. Some of the symptoms are similar to those of complete myxedema, only of less degree, while other symptoms are of entirely different character from, or even opposite to those of the complete form. These cases may remain partial throughout, and not progress to complete athyroidism, or they may recover. In the partial, as in the complete forms of myxedema, spontaneous adult, infantile, and postoperative varieties occur. It must not be forgotten that many of the symptoms of myxedema are merely significant of metabolic disturbances of a general sort, and it may be urged that those who argue in favor of the frequency of larval cases too easily persuade themselves that such symptoms are thyroidal in cases in which no thyroid disease may be present.

Spontaneous Adult Partial Myxedema. ETIOLOGY. In the etiology of this condition heredity is a marked factor, as shown especially by the occurrence of other forms of thyroid disease in other members of the family. The disease is more common in women, and between the ages of thirty and fifty. There is probably a defective constitution or lessened resistance, so that the thyroid is more susceptible to inflammatory or sclerotic changes. In a number of cases, the myxedematous condition has been preceded by evidence of increased activity of the thyroid, while mixed cases occasionally occur. The onset is gradual and insidious.

SYMPTOMS. The symptoms are varied, and may be grouped under the following heads:

Asthenia. This is noted by the patient as a feeling of lassitude or tiring upon slight exertion.

Mentality. Impairment of intellect or memory, sluggishness or apathy, although not as extreme as in the complete form.

Pain. This is present in the form of recurring headache, backache, or articular and muscular pains.

Metabolism. Generally lowered similar to but seldom to the degree seen in the complete form, and consisting largely of a marked retention of nitrogen.

Obesity. This is due to deficient metabolism, and may be general or in the form of local deposits.

Hypothermia. Probably due to the lowered metabolic activity. The patients feel cold and shivery, and are subject to chills upon slight exposure.

¹ Journal of the American Medical Association, April 10, 1909.

Integument. The skin is dry and harsh, with a tendency to scaling. Thickening, infiltration, and tumefaction may occur, although never to the extent seen in the complete form. The nose and ear lobes may be thickened, the cheeks full, the chin rounded, the backs of the hands and feet puffy, and transitory edemas occur on the face or extremities. The nails and hair show trophic changes.

Circulatory System and Blood. Palpitation and tachycardia are present, due probably to a weakened dilated heart. Venous enlargements, vasomotor spasms, and a hemorrhagic tendency are frequently noted. A mild anemia develops with a normal leukocyte count, but a relatively marked lymphocytosis (up to 60 per cent.).

Alimentary System. The teeth show caries and decay; the gums are swollen, reddened, and bleed easily; the tongue is often enlarged. Hypochlorhydria, congested liver, cholelithiasis, and constipation are often noted.

Respiratory System. There is swelling of the mucous membrane of the nasopharynx, and enlargement of all the lymphatic structures of the throat, with a consequent catarrh.

Reproductive System. Uterine hemorrhage of various types is frequently observed, although normal or even scanty menses occur. The advent of the menopause may be delayed. Pregnancy or childbearing apparently have little influence upon the development of the condition, although they cause either an increase or a decrease in the symptoms of hypothyroidism, depending upon whether they depress or stimulate the thyroid.

Infantile Partial Myxedema. A distinction is made between congenital myxedema, or cretinism, and the so-called infantile form, the one developing at or within a few months of birth, and the other developing at any time up to puberty. Partial myxedema, as seen in children, is nearly always of the infantile type. It occurs more frequently in males, and may follow some acute infection, as measles. The most typical form is seen in cases in which attenuated symptoms of myxedema are associated with a condition of infantilism. The figure is short, stunted and obese; the head is large; the face is large and round; the eyes are well separated; the expression is dull, heavy, and aged; the skin, especially of the hands and face, is thickened, infiltrated, dry, and scaly; the hair is scanty; the veins are distended; the surface is cyanotic, and the hands and feet are cold. The bowels are constipated and the abdomen protuberant. The tongue may be enlarged, and the mucous membrane of the respiratory passages thickened so that respiration may be obstructed. The mentality is slightly lowered, or remains of a childish type, although in some it may be impaired. There is usually arrest or retardation of physical development, so that a subject of mature years may have the size, build, and appearance of a child at the age at which the disorder appeared. There is especially non-development of the sexual organs and functions.

Hutchinson¹ describes several cases of myxedematous infantilism which were much benefited by the administration of thyroid extract. He suggests that many of the cases of so-called idiopathic infantilism are really myxedematous.

Postoperative Partial Myxedema. This is the type seen in adults after thyroidectomy, the symptoms being much the same as described under the spontaneous form. In all of these types the therapeutic test of the administration of thyroid extract is the conclusive one in arriving at a diagnosis.

Cretinism. Murray² reports three cases of sporadic cretinism, which are of interest. One in a girl, who was apparently healthy until eighteen months of age, when she ceased to grow. She slept poorly, and was ill tempered. When seen, at the age of six years, she was twenty-eight and one-half inches high, and presented the typical appearance of a cretin. Under thyroid treatment for six months, her height increased by two and one-quarter inches. The anterior fontanelle closed, the swelling of the face diminished, and the lips became normal in appearance. The two other cases were in children born of healthy parents and having eight sisters and brothers all fairly healthy. The brother, aged twenty-eight years, was fifty-three inches high and had shown symptoms of cretinism since childhood. He presented the typical aspect of an adult cretin. The genital organs were well developed. In him, improvement was only moderate after thyroid treatment. The sister was aged twenty-five years. She was of average size at birth, but had always been dull and very late in learning to walk. She remained indoors most of the day doing nothing, sleeping most of the time. Except for four months, she has menstruated normally since fifteen years age, but the flow has always been scanty. Her height was forty-eight and one-half inches. She presented the typical aspect of a cretin, although in less degree than her brother. There was a large lobulated goitre in the neck, the right lobe of the thyroid containing two adenomata, the maximum diameter of the one being four inches and of the other two inches. The isthmus contained an adenoma the size of a pigeon's egg, and there was another small one in the left lobe, the total circumference of the neck over the goitre being eighteen inches. The breasts were well developed, but pubic and axillary hair was scanty. Under thyroid administration, there was decided improvement in her general condition, both physical and mental, the temperature came up to the normal and the circumference of the neck was reduced to fourteen inches, due especially to marked diminution in the size of the adenomata.

Thompson³ reports the case of a girl, aged eighteen years, who was

¹ British Journal of Children's Diseases, February, 1909.

² Lancet, September 11, 1909.

³ Ibid., September 25, 1909.

forty inches tall and weighed fifty-eight pounds. Under the administration of thyroid, in the form of 1 grain of iodothyryn night and morning, increased to 5 grains three times daily, she showed signs of overdosing, so that the dose was reduced to 1 grain daily. Her height increased to forty-two inches. She lost the dull, heavy, idiotic expression, and her face became intelligent. She lost much of her subcutaneous fat, could walk five miles at a stretch, and entered into games. The thick coarse teeth are being replaced by a second set. She engages in conversation, enjoys jokes, and has made remarkable progress in her studies.

TREATMENT. While this has been suggested in the discussion above, a brief statement will be made at this place. Inasmuch as the disease has now been very definitely proved to be due to lack of thyroid secretion, a replacement of this by some form of thyroid substance seems reasonable and scientific. There has always been a question as to the nature of the special substance in the thyroid gland or extract, which gave to it its activity, and whether iodine has any relation to the activity of these preparations.

Editorial comment has been made¹ upon the work on this subject, and especially on that of Roos, Hunt, and Hunt and Seidell. To test thyroid preparations, Hunt has proposed an interesting method based upon the fact that the feeding of definite quantities of thyroid substance to mice greatly increases the resistance of these animals to a certain poison, acetonitril, so that they can withstand many times the ordinarily fatal dose. In view of the fact that thyroid feeding has the opposite effect upon rats, lowering their resistance to acetonitril, and that rats and mice are made less resistant to morphine by thyroid, the test would seem to rest upon rather insecure ground; and yet Hunt places great faith in its accuracy. Hunt and Seidell further showed that this action of the thyroid substance closely parallels the iodine content. Further, inasmuch as the thyroid of newborn infants and of certain animals contains no iodine, it is necessary to assume that the thyroid may possess a substance which is active independently of any iodine combination, but the activity of which is enhanced by the presence of iodine.

Williams² calls attention to the importance of observations of the *temperature* during the administration of thyroid. He states that as thyroid insufficiency is characterized by a subnormal temperature, and thyroid excess by a supernormal temperature, the change from one to the other should act as a clinical guide for the giving of thyroid extract to children, especially over long periods of time.

As giving some idea of the beneficial results of thyroid treatment in cretinism, a report of von Kutschera³ is of considerable interest. He states that since 1905 the Austrian Government has been supplying

¹ Journal of the American Medical Association, April 17, 1909.

² British Journal of Children's Diseases, June, 1909.

³ Wien. klin. Woch., June 3, 1909.

thyroid tablets free of charge in seven endemic foci of cretinism, with medical inspection twice a year. About 108,000 tablets were thus distributed in 1907, and 157,000 in 1908, the number of persons taking them being 1011. A special study was made of the physical development of these patients under treatment, particular stress being placed upon the increase in height as the most certain index of improvement. In 677 cases followed to date, marked improvement was obtained in 48.6 per cent., and only 8.6 per cent. showed no benefit from the course. The most striking proof of the beneficial influence of thyroid treatment on the growth is the fact that, in 377, the former dwarf cretin children grew to be taller than the normal standard for their age. The treatment was, as a rule, restricted to school children; the oldest cretin was aged twenty-six years. After twenty a number of cretins grew much taller and the other symptoms of cretinism were attenuated. The growth at this age is so marked that it seems as if the growing power of the preceding years had been held in reserve until suddenly released by the thyroid treatment, when it made all its force felt in a relatively short time.

EXOPHTHALMIC GOITRE.

Considerable work has been done on this subject during the past year, as evidenced by the large amount of literature published. Interest has centred chiefly around the relation of the various pathological changes in the thyroid to the clinical symptoms, the physiological chemistry of the disease, and the relation of the thyroid gland either in its normal or diseased state to the other organs having internal secretions.

As an introduction to this subject, a reference to the brief résumé of Werelius¹ upon the steps in our knowledge of this subject may not be out of order. He says that not until 1800, when Lodéré first described the difference between struma and cretinism, did the thyroid begin to attract any special attention. During the last century, and in more recent years, the experimental work on this gland has steadily increased. The anatomy of the thyroid seems to be fairly well understood, for which the reader is referred to standard text-books. Although an enormous amount of work has been done on the chemistry of the thyroid, there is no general agreement as to its exact chemical composition. The physiology of the gland has been an interesting field of study, and one which has revealed many confusing facts. The older authors attributed various functions of a physiological nature to the thyroid, and it was only after the results of excision of the gland and of the feeding of thyroid substance had been noted that we began to arrive at its true significance. The important relation of iodine to the physiological activity of the gland was first noted

¹ Journal of the American Medical Association, July 17, 1909.

by Baumann. It has since been emphasized by many others, and it is now generally held that the substance iodothyrene is the active principle of the gland. The thyroid has a vast influence upon nutritional changes in the organism. Administration of the gland causes a decided increase in the elimination of nitrogen and of carbon dioxide. However, with the rise of the latter there is a greater increase in the intake of oxygen, so that the respiratory quotient is lowered. In conditions of hypothyroidism there is a general lessening of all metabolic activities. In hyperthyroidism all of the metabolic activities are greatly increased. For many years it has been assumed that the thyroid gland, along with the other ductless glands, possessed an internal secretion. Attempts to isolate such a substance, however, have thus far met with failure. Working on the theory of hyperthyroidism in exophthalmic goitre, a number of investigators have been able to produce the typical symptom complex of this disease by flooding the system with thyroid products.

The detoxication theory, first advanced by Blum and since confirmed by other investigators, is to the effect that in the course of metabolism there is formed in the body a toxic globulin and that this is detoxicated in the thyroid by the chemical action of iodine. The study of the relationship of the thyroid to the various other ductless glands has not resulted thus far in giving us any very definite knowledge. It has been shown that the extracts of the hypophysis and of the thyroid produce entirely contrary effects, and that the parathyroids and the thyroid probably have no functional relationship.

Etiology of Exophthalmic Goitre. MacCarty¹ looks upon exophthalmic goitre as a *process of reversion of the gland to some former function*. He regards the gland as similar to the other glands of the body, originating from invaginations of the entoderm or the ectoderm. Like all of these, except the liver, its histological unit consists of an alveolus lined by one layer of epithelium which hypertrophies and secretes into the central canal. At some time in the development of man the gland probably opened into the alimentary canal by a duct, as evidenced by the remains of the thyroglossal duct. Under certain conditions this partially rudimentary gland might revert to its original activity. Two possibilities might result—either there would be a cyst formation, or an absorption of the products formed. The first of these possibilities is to be noted in the “simple cystic goitre,” while the second is seen in the “exophthalmic goitre.” In one there is a collection of distended cysts lined with flattened epithelium in various stages of atrophy, with practically no toxemia and causing symptoms largely by pressure. When atrophy is complete, myxedema may result. In the exophthalmic goitre, the increased material secreted is absorbed and gives rise to the various symptoms of toxemia. The reason for the stimulation to increased activity of the gland is not known.

¹ American Journal of the Medical Sciences, June, 1909.

Forsyth¹ still holds his idea that the *parathyroid glands are aberrant or developing thyroids*, and are therefore of importance in the etiology of exophthalmic goitre.

S. Solis Cohen² looks upon Graves' disease as the *result of a vasomotor ataxia* which may follow thyroid intoxication from excessive activity of the gland with or without hypertrophy. He reports three cases in support of this conception.

The *relation of the so-called simple goitre to exophthalmic goitre* is discussed by Wilson³ in a report of a short series of selected cases from about 600 thyroids removed by Dr. C. H. Mayo. In Graves' disease two factors come into prominence—increased secretion, and increased absorption. In all the 600 thyroids, there was evidence of decreased work and decreased absorption; swollen acini whose walls were either stripped of their parenchyma or lined with thin flattened feebly staining epithelium, and whose contents were apparently non-absorbable. In certain simple goitres, however, where absorption was cut off from a portion of the gland, there resulted a compensatory hypertrophy of the rest of the gland, either by an increase of acini or by a proliferation of the parenchyma of existing acini by reduplication of its layers, infolding of the acinal walls, or papillary projections into the acini. Where this process is merely sufficient for compensation, no symptoms of hyperthyroidism arise, but when it proceeds to overcompensation, where the secreting structures are discharging a relatively increased amount of secretion into the lymphatics, we have the symptoms of Graves' disease supervening upon those of simple goitre. On the other hand, certain cases of Graves' disease may show such a degeneration of the thyroid as to approach the simple goitre in type.

Other changes in the thyroid are related more or less closely to exophthalmic goitre as pointed out by MacCarthy.⁴ The normal thyroid is composed of alveoli lined with one layer of epithelium. It secretes a substance which contains a partially non-absorbable substance known as colloid, some of which at least remains in the alveoli. In the simple goitre or cystic goitre, in which the alveoli are large and filled with colloid, there is an excess of secretion and production of colloid without an equal amount of absorption. In the type known as exophthalmic goitre there is an excess of secretion and increased absorption, with slight, if any, increase in colloid production. There may be a stage in which the symptoms are very excessive, and in which, histologically, an extreme cytolysis is seen. We then have a condition of extreme excess of the products of the degenerating cells with increased absorption, which may not necessarily be equal to the amount of secretion. This may occur in the papillary cystic, hypertrophic,

¹ Clinical Journal, July 28, 1909.

² International Clinics, Series 19, vol. iii.

³ Surgery, Gynecology, and Obstetrics, June, 1909.

⁴ Loc. cit.

parenchymatous, and fetal adenoma. There is still another stage, which may be termed the cured stage. This stage is seen in those cases which have withstood the overgrowth and excess of secretion and cytolysis until there remains a large tumor composed of alveoli lined by thin connective tissue or atrophic cells, instead of heavy epithelium and filled with colloid material. These patients suffer only the inconvenience of a tumor without the toxic effect, and may eventually show a condition of myxedema as a result of the lack of secreting surface.

McDonald¹ considers the change in exophthalmic goitre one of hypertrophy of the thyroid with excessive activity giving rise to symptoms. This hypertrophy appears to be in response to the continued action of certain toxins or stimulation bodies. He refers to the suggestion of MacCallum that the underlying cause in these cases is an infection of some sort. He had under observation a patient who had had a long and severe attack of typhoid fever some years before the exophthalmic goitre made its appearance.

The influence of *heredity* in the etiology of this disease is somewhat obscure. It is sometimes seen in families having a history of various mental or physical defects. Long² reports the occurrence of exophthalmic goitre in a girl, aged ten years, with the hereditary history of a father showing mental deficiency; one brother feeble; one sister with headaches, constipation, and disorders of digestion. Newman³ reports a case of exophthalmic goitre in an unmarried woman, aged thirty-one years, whose mother suffered from a parenchymatous goitre. Her mother's sister also had a goitre. One of the patient's sisters had an exophthalmic goitre, another had an adenoma of the thyroid. Schmauch⁴ reports the case of a woman, who, at the age of twenty-six, began to show symptoms of Graves' disease. At this time she gave birth to a baby girl, who was apparently normal. At twenty-eight the goitre had increased, and a boy born in this year showed signs of rickets. At thirty another boy was born. He had an immense head and showed signs of cretinism and rickets. The fourth child, born at thirty-two, at a time when the mother almost succumbed from the goitrous symptoms, shows signs of Graves' disease associated with osteomalacia or rickets.

Among *other etiological factors*, several are referred to by Vetlesen.⁵ Of the 43 cases studied, all but 2 were women, and the majority of the cases developed between the ages of twenty and thirty, and between forty and fifty. A *fright* or *great sorrow* had evidently something to do with the onset of the affection in several cases, and *acute articular rheumatism* or *rheumatic complications* were present in 8. One patient had had acute rheumatism five times. Eight of the patients had suffered

¹ Journal of the Indiana State Medical Association, May, 1909.

² American Journal of Obstetrics and Diseases of Women, 1909, p. 1073.

³ Lancet, November 27, 1909.

⁴ Ibid., July, 1909,

⁵ Norsk magazin for Laegevidenskaben, January, 1909,

from *hemicrania*, and 3 of these and 5 others had a family history of hemicrania in parents or grandparents. Simple goitre was noted in the direct family antecedents of 4, and 4 others had brothers or sisters with goitre. He also brings out the interesting fact that the administration of thyroid had transformed several cases of simple goitre into those of the exophthalmic type.

It may be assumed from recent observations that the glands with internal secretions do not act as so many isolated units, but that they exert a considerable amount of influence on each other. Thus, the thyroid secretion not only plays an important part in general metabolism, and especially in the oxidation of the tissues, but it appears to influence the secretion of other glands in a special manner, so that any modification of the function of the thyroid may be followed by changes in the action of other glands as well. The *relation of the thyroid gland to the ovary* has attracted a great deal of attention. Pinard¹ has studied this relation as found in exophthalmic goitre and ovulation in 9 cases. He does not accept the German view that pregnancy aggravates the tendency to exophthalmic symptoms, but rather agrees with Charcot that improvement is liable to follow measures to regulate the menstrual functions. He thinks that the reported cases of aggravation of goitre symptoms during pregnancy are really instances of auto-intoxication and uncontrollable vomiting, and not the effect of the pregnancy.

Smauch² believes that the thymus and especially the ovary are probably quite closely connected or associated with the thyroid in causing exophthalmic goitre. The latter seems to be borne out by the changes in the thyroid occurring at puberty, during menstruation, pregnancy, and lactation, and at the menopause. The ovaries and the thyroid seem to have a direct connection with the bony and connective tissue development, as evidenced by the degeneration of striped muscle in Graves' disease, the myxedematous degeneration of the connective tissue in insufficiency of the thyroid, the increase in adipose tissue, and mild signs of insufficiency of the thyroid at the menopause. The relations of these glands are probably synergetic, while, according to Hoffman, there is an antagonism between them and the adrenals.

Pathology of Exophthalmic Goitre. Considerable interest has been shown during the past year in the relation of the pathological changes of the thyroid in exophthalmic goitre to the changes in the other forms of goitre. MacCarthy³ has studied this problem carefully, and concludes with Wilson that the different "types of goitre" are to be regarded as "stages" through which the gland may pass. In support of this he gives the following classification, which is based upon pathological findings: (1) The simple cystic or colloid goitre, recognized clinically as an

¹ *Annales de Gynécologie et d'Obstétrique*, May, 1909.

² *American Journal of Obstetrics and Diseases of Women and Children*, July, 1909.

³ *American Journal of the Medical Sciences*, June, 1909.

enlargement of the thyroid without symptoms, other than pressure. Histologically, it is composed of multiple small or large cysts with their contents. (2) Hypertrophic parenchymatous goitre, characterized clinically by symptoms of hyperthyroidism, and histologically by an increase in the epithelial or secreting surface of the gland. This is the "exophthalmic goitre," a designation which should be dropped, as it is based upon the clinical sign of exophthalmos, which is not always present in cases of hyperthyroidism. (3) Papillary cystic goitre, or thyroid, which at some period develops symptoms of hyperthyroidism, and which histologically shows cysts filled with colloid, with the addition that there are papillary projections into the lumina of the alveoli with consequent increased secreting surface. This type, or stage, approaches the hypertrophic parenchymatous goitre histologically and clinically. (4) Hypertrophic fetal thyroid is seen in the goitre of the cretin, with tumor formation and hypothyroidism. Histologically, there is a small amount of epithelial tissue and a great amount of interglandular connective tissue. (5) Fetal adenoma of the thyroid is a more common form than the one just described. It is seen clinically usually as an encapsulated tumor in the thyroid, not causing inconvenience other than that of pressure. If, however, the tissue should degenerate from some unknown cause, the products may be rapidly taken up by the lymphatics, and thrown into the circulation, giving symptoms of hyperthyroidism.

That goitre may rarely be of *parathyroid origin* is exemplified by a case reported by Bérard and Alamartine.¹ The patient was a woman, aged forty-three years, in whom goitre had been first observed at puberty, and this was noted to increase in size with the menopause, when she began to show symptoms of mild exophthalmic goitre. The tumor proved to be a fetal adenoma originating in islets of parathyroid tissue included within the body of the thyroid.

Sudler² distinguishes two main groups of goitre: In the *primary form*, associated with definite hyperplasia with active proliferation of gland cells, the gland is symmetrically enlarged, the veins are prominent, the circulation active, and the gland adherent. With such glands, all the symptoms appear rapidly, and a large per cent. go on to fatal termination. The *secondary type* is illustrated by the goitre of long standing, showing cellular hyperplasia and increase of the stroma throughout the gland, or a part of it, with the development of cysts. The gland is asymmetrical in its enlargement. The symptoms develop slowly and are not so severe; in some cases they may be absent altogether. McDonald³ also calls attention to these two groups.

MacCallum, in a recent article on the "Pathology of Exophthalmic Goitre," has described as characteristic of this disease a *budding or*

¹ Lyon Chirurgie, February, 1909.

² Journal of the Kansas Medical Society, March, 1909.

³ Loc. cit.

infolding of acinal epithelium of the thyroid, together with certain alterations in the morphological character of the lining cells. Shepherd and Duval¹ studied 59 cases with this characteristic in view; 18 were unquestionably cases of Graves' disease, 2 of which proved fatal. The infolding and budding of the acinal epithelium was present in some parts of the gland in 20 cases. The microscopic study of a large number of sections from each specimen of gland, however, showed neither cellular arrangement nor cytological changes ordinarily detected by routine staining methods which could be regarded as specific for any special type of disease of the thyroid gland. Although infolding and budding of the acinal epithelium occurred in the gland of exophthalmic disease, it was not at all constant. Occasionally, these changes were entirely absent in unquestionable cases of Graves' disease, while, on the other hand, they occurred frequently in simple goitre and other benign conditions of the thyroid gland in which there was hyperplasia. Infolding of the epithelium may occur in any thyroid gland in which active hypertrophy is going on, especially in the absence of colloid production.

C. H. Mayo² prefers, with Wilson, the term hypertrophic parenchymatous goitre, as it represents the essential change in the gland, an increase in the epithelial or secreting surface of the gland. The cells are increased, there being more of them in the alveoli or more alveoli. The size of the gland may have no relation to the severity of the symptoms, as a part or the whole of the increase may be due to retained secretion. The symptoms of hyperthyroidism are really caused by a thin non-stainable secretion, the "iodothyroglobulin," which has been and is leaving the gland probably by way of the lymphatics.

Symptoms of Exophthalmic Goitre. According to Dorsey,³ there are five cardinal symptoms of this disease: (1) Increased action of the heart, with palpitation; (2) enlargement of the thyroid gland; (3) prominence of the eyeballs, or exophthalmos; (4) fine rhythmical tremor; and (5) general nervousness.

The most constant and important symptom is the tachycardia, often associated with constant or intermittent **palpitation**. The heart varies in size, being dilated in 30 per cent. of the cases, the right ventricle being especially affected. The apex impulse is more marked than normal, and is diffuse in character. The heart sounds are accentuated, and murmurs may be found at the apex or base, due, as a rule, to the excited and accelerated action of the heart. Murmurs are also heard over the vessels of the neck, and over the brachial and femoral arteries. The radial pulse is small and quick, sometimes dicrotic, and, in severe or late cases, irregular or intermittent. There is a capillary pulse, and sometimes pulsations of

¹ Annals of Surgery, July, 1909.

² Texas State Medical Journal of Medicine, July, 1909.

³ Journal of the Indiana State Medical Association, August 15, 1909.

the liver and spleen. Murray¹ states that tachycardia may be the sole symptom of disease of the thyroid. This is sometimes referred to by writers² as "thyroid heart."

Mayo³ points out that with the increased frequency of the pulse there is an excess of blood in the capillary and smaller vessels. This latter condition increases the action and work of the heart. Later, when overwork and toxemia from the elimination of disorganized epithelium of the thyroid has caused a degeneration of the heart muscle, liver, spleen and kidney, there results a dilatation of the heart with irregularity in rhythm and in the tension of the pulse. Incomplete contraction and imperfectly closed valves, with resulting pulsating large veins, causes a fall of blood pressure. As a result of the weakening of the heart and the fatty changes in the liver and kidney, edema of legs, hands, and eyelids results, with ascites, varicose veins, and hemorrhoids. There may be epistaxis, bleeding from the gums, and even pulmonary hemorrhages. There is decrease in the red cells, and a normal or decreased number of leukocytes, with a relative increase in the number of lymphocytes at the expense of the polymorphonuclears.

The *thyroid gland* is distinctly, although not greatly, *enlarged* in many individuals, though Sudler⁴ calls attention to the fact that enlargement and exophthalmos are unduly emphasized, as they occur in only about 80 per cent. of the cases. Mayo⁵ also states that goitre is not essential. In early cases, the gland is soft, while in older cases the gland becomes firmer and most elastic, the surface at times presenting a granular appearance due to lobular hyperplasia. In typical cases, the tumor is vascular and pulsates, there being a palpable systolic expansion. Murmurs may be heard at the entrance of the vessels into the gland, and a thrill is often distinctly felt. That the size of the enlargement bears no relation to the severity of the symptoms is pointed out by a number of writers. Putnam⁶ notes that the symptoms of dyspnea and smothering are apt to occur with marked hypertrophy and direct pressure upon the trachea, while tachycardia and neurotic disturbances are most severe in association with very small tumors.

The **exophthalmos** is present in about two-thirds of the cases. It imparts to the face a strikingly staring look. The pupils are normal, and react normally, but may be unequal or dilated. If the exophthalmos is unilateral it is usually on the side of the struma. This, according to Suker,⁷ is to be explained by several theories, the chief of which is that there is a vasomotor paralysis of the orbital vessels dependent upon

¹ British Medical Journal, February 13, 1909.

² Berlin. klin. Woch., March, 1909.

³ Texas State Journal of Medicine, July, 1909.

⁴ Journal of the Kansas Medical Society, March, 1909.

⁵ Loc. cit.

⁶ Northwestern Lancet, March 15, 1909.

⁷ Ophthalmic Record, July, 1909.

sympathetic interference, permitting a constant congestion. After this has persisted for some time, an increase of the tissue in the orbit takes place, so that there is a permanent exophthalmos.

In a critical résumé of the *cardinal lid signs* in this disease Suker divides them into three groups: (a) Palpebral signs; (b) ocular and ocular muscle signs; (c) intra-ocular signs, including the fundus changes. The palpebral signs are:

1. *Von Graefe's sign*, having three characteristics: (a) The moderate encroachment of the lid upon the cornea, being less than normal for that individual; (b) the jerky downward rotation of the lid—slower than that of the eyeball; (c) the jerky upward rotation of the lid in advance of the eyeball.

2. *Stellwag's sign*—widening of the palpebral fissure.

3. *Dalrymple's sign*—practically the same as Stellwag's sign.

4. *Gifford's sign*—the difficult eversion of the upper lids.

5. *Suker's Sign*. This is a new sign, proposed by Suker, and is brought out as follows: With the eye in downward rotation, the lower lid is gently fixed. The patient is then requested to rotate the eye rapidly upward while gentle retraction is made on the lower lid; the eye-ball now ascends in an unsteady manner. This is markedly accentuated in the presence of an exophthalmos. The sign is as variable as the other lid signs.

6. *Lid Quivering, Lid Tremor* or, *Rosenbach's Sign*. There may be also pigmentation of the upper lids, edema of the lids, loss of eyelashes and eyebrows.

The ocular and ocular muscle signs are: (1) Corneal anesthesia and inflammation; (2) conjunctival edema; (3) nystagmoid movements; (4) *Moebius' sign*, or the inability to hold the eyes in the position of convergence; (5) exophthalmos; (6) limited rotatory excursions of the eye; (7) ophthalmoplegias.

The intra-ocular changes are: (1) Retinal pulsations; (2) choroidal and retinal inflammatory disturbances; (3) pupillary and accommodative disturbances.

To these Dorsey¹ adds the following: Failure of the forehead to wrinkle upon looking up, epiphora, or overflow of the tears, subjective feeling of pressure behind the eyes, abnormal dryness of the eyes.

There has always been considerable obscurity as to the exact manner in which the main eye symptoms of this disease have been produced. Editorial comment² is made of Landstrom's³ work on this problem. He removed the contents of several orbits intact, by subperiosteal dissection, together with the lids and orbital septum, and sectioned them serially in various planes. He was able to demonstrate a well-developed

¹ Loc. cit.

² Journal of the American Medical Association, February 6, 1909.

³ Ueber Morbus Basedowii, Thesis, Stockholm, 1907.

cylinder of plain muscle arising from the orbital septum, anteriorly, and inserted just posterior to the equator of the ball. The action of this muscle is offset normally by the pull of the recti muscles. The eye signs in exophthalmic goitre may now be readily explained as a sympathetic stimulation of this muscle. A spastic condition of the muscle would have, as its first effect, a widening of the lid slit (Stellwag's sign), from which an incoördination in the movements of ball and lid would follow as a natural consequence (von Graefe's sign). The superior and inferior tarsal muscles running vertically in the lids doubtless assist in the production of these two phenomena. Exophthalmos results when the hypertonicity of the plain muscle overcomes the tonus of the recti muscles. A spastic condition of the plain muscle would also tend to overcome the tonus of the internal rectus, and a break in convergence would follow (Moebius' sign).

The *muscular tremor* is rapid and rhythmical, with eight or nine vibrations to the second; it is usually limited to the muscles of the extremities, and is exaggerated by excitement. In some cases, muscular twitchings like those in chorea may be noted in addition to the tremor.

Nervousness is in marked contrast to the apathy of myxedematous patients. There is marked irritability and unstableness of the nervous system, the patients being restless, excitable, and easily agitated. There may be severe headache, vertigo, and even delirium may develop. Disturbance of digestion and loss of weight may be marked, the latter dependent upon the decrease in the stored up fat of the body and the atrophy of the muscles. Vomiting and diarrhea is present in 50 per cent. of the cases, usually late in the disease, although they may appear early. The skin is smooth and moist; excessive sweating appears in 90 per cent. of the cases accompanied by hot flashes. Erythema of the neck and upper chest may be present, and various pigmentations of the skin have been reported in 40 per cent. of the cases. There may be loss of hair and atrophy of the nails in a few cases. There are few symptoms referable to the respiratory tract. Dyspnoea may appear late, usually cardiac in origin, although it may result from the anemia. Menstruation is, as a rule, disturbed, usually in the form of a decrease in the amount of the flow.

Among some of the later effects of this disease, the occurrence of **diabetes** should be noted in view of the interest in the relation of the various internal secretions. Recently, experimental evidence has been produced by Eppinger, Falta, and Rudinger¹ to show that the thyroid and pancreas tend to inhibit each other, so that an increase in the function of the thyroid gland leads to a diminution of function in the pancreas, and a diminution of function in the thyroid permits an increase in the functional activity of the pancreas. As a result of the hyper-

¹ PROGRESSIVE MEDICINE, June, 1909.

thyroidism in Graves' disease, there is an inhibition of the pancreas which causes a relative insufficiency of its internal secretion. This results either in actual alimentary glycosuria, or in a condition in which glycosuria readily results after increased carbohydrate diet. In these cases the pancreatic disease is the outcome of the prolonged inhibitory action of the excessive thyroid secretion, which at first leads only to glycosuria, but later to atrophy and fibrosis of the pancreas, and especially of the islands of Langerhans, from which a severe and often fatal form of diabetes results.

This sequence is well illustrated by four cases reported by Murray.¹ The first, a single woman, aged twenty years, had been treated with a special serum and electricity, in 1903 and 1904, for symptoms of exophthalmic goitre of eighteen months duration. Four years later she again came under observation because of a diabetes mellitus of rather severe type, which later proved fatal. The evidence of the previous thyroid disease had disappeared, with the exception of slight enlargement of the gland. The autopsy revealed an almost normal thyroid and with very slight evidence of previous activity. The pancreas showed a distinct increase in the amount of the connective tissue throughout, and an almost complete disappearance of the islands of Langerhans. The second case was that of a married woman, aged twenty-five years, with a history of nervous shock at sixteen, followed by hystero-epileptic attacks. She developed signs and symptoms of exophthalmic goitre in 1905. In 1908 she showed slight evidence of the previous thyroid disease, but was found to be suffering from a severe form of diabetes mellitus. The third case was that of a married woman, aged thirty-eight years, who at twenty-five had shown slight enlargement of the thyroid gland associated with exophthalmos, which subsequently disappeared. At twenty-eight, she was given thyroid tablets for a few weeks, and the former symptoms reappeared. At thirty-eight, she presented distinct signs of exophthalmic goitre, and the urine contained sugar. Seen thirteen months later, she had gained a little in weight, but the urine contained diacetic acid. Four months later she died in diabetic coma. The fourth case was that of a man, aged thirty-two years. At sixteen, he had had a severe scarlet fever followed by edema. At twenty, the edema reappeared, and at twenty-two he presented a goitre, exophthalmos, and tremor; ten years later diabetes developed. There was slight enlargement of the thyroid gland, with a small adenoma in the right lobe and slight exophthalmos. This group shows exophthalmic goitre in four cases, three women and one man, in which severe diabetes developed at a variable period after the exophthalmic goitre. In each case, the symptoms of the exophthalmic goitre had either subsided or decreased considerably by the time the diabetes showed itself. Brief

¹ Clinical Journal, July 28, 1909.

reference is also made to two cases of combined disease of the thyroid gland and of the hypophysis, associated with diabetes. The one, a single woman, aged thirty-seven years, had symptoms of typical acromegaly. She also had a goitre, with rapid pulse, exophthalmos, and tremor. The urine contained sugar. The other case was that of a widow who had typical signs of acromegaly, and glycosuria. At the autopsy, the pituitary gland was hypertrophied and the thyroid gland enlarged.

The influence of exophthalmic goitre upon **pregnancy** is very variable, although, in the majority of cases, it is very slight. This relation has already been referred to briefly. Stowe¹ states that the patient may grow rapidly worse in the early months of pregnancy, and die, presenting a clinical picture similar to that of pernicious vomiting of pregnancy. In other cases, the symptoms may be held in abeyance till the puerperium, and then come on with great severity. The puerperium may, on the other hand, exert a favorable influence upon the course of the disease. The recurrence of pregnancy may have a deleterious effect upon the disease, the condition frequently growing worse as the number of pregnancies increases, and the secondary changes become more pronounced.

Prognosis of Exophthalmic Goitre. The prognosis of this disease is uncertain. Some cases subside, others run a chronic course, with periods of temporary improvement, while others may progress slowly or rapidly to a fatal termination. The end is marked by a great increase in the nervous manifestations, great restlessness, hallucinations, and active delirium. The temperature goes up to 104° or 105°, the pulse and respirations are much increased, and vomiting and diarrhea appear. There is often profuse sweating and marked jaundice.

Treatment of Exophthalmic Goitre. Although much of the work on exophthalmic goitre during the past few years has dealt more or less directly with this phase of the subject, we are yet quite unprepared to draw any definite conclusions from the evidence thus far presented. Of the various measures of a medical nature now demanding interest, that of *serum therapy* probably occupies first place. Rogers and Beebe² have previously shown that the fundamental premise in the treatment of thyroidism by an active antiserum is that the symptoms of the disease are caused by a hyperactivity of the thyroid. The serum is designed to neutralize, by its antitoxic property, the effects of the thyroid proteid in the circulation, and to inhibit, by its cytotoxic property, the secretory activity of the gland. The serum is prepared by the inoculation of animals with pure proteids from human thyroid glands. Antibodies are thus produced in the animal which are specific for the human thyroid. These investigators believe that the serum produced by the

¹ American Journal of Obstetrics and Diseases of Women and Children, May, 1909.

² Archives of Internal Medicine, November 15, 1908; Editorial, Journal of the American Medical Association, July 17, 1909.

nucleoproteid of the thyroid is more cytotoxic, and that produced by thyroid globulin is more antitoxic in its action.

The cases favorable for serum treatment are those in which the gland is probably hyperemic, or hyperplastic, and include the early typical cases of exophthalmic goitre in their incipient, mild or severe forms, and typical exophthalmic goitre of a subacute form with occasional exacerbations before secondary changes have set in. The dose of the serum will depend upon the severity of the disease and the nature of the reaction to its administration. As a rule, 0.5 c.c. of active antiserum is given at first, as often as the reaction permits, and later at intervals of from five to seven days. Exophthalmos and goitre are the last symptoms to disappear, and as long as the goitre persists there is some danger of a recrudescence of symptoms under mental or physical strain.

Of 246 cases reported by Rogers and Beebe, 227 were considered favorable for serum treatment. Of these, about 30 per cent. were cured of subjective symptoms, and only a slight enlargement of the gland could be noted upon deep palpation. About 50 per cent. of the patients improved, although a small goitre usually persisted. About 20 per cent. failed to show beneficial effects, and, of these, about 10 per cent. died.

McWilliams¹ highly recommends the use of this antiserum. Guthrie² reports the successful treatment of three recent cases. The serum was given for about three months. Hecht³ doubts whether a specific serum can be produced that will not contain substances so toxic for the body that they will be harmful, and even dangerous. An antiserum, to be effective in this disease, must be specific for the thyroid, and must neutralize only the toxins of hyperthyroidism without in any way influencing other metabolic processes.

Another form of serum treatment depends upon the use of *antithyroidin*, as proposed by Moebius, which is the serum obtained from thyroidec-tomized sheep. It is put up in small vials of 10 c.c., with the addition of 0.5 c.c. of carbolic acid solution. It is given by the mouth in ascending doses of from 5 to 40 or 50 drops daily. Galli-Valerio and Rochaz⁴ report favorably upon its use in a patient who had resisted other forms of treatment. Hecht⁵ has used it with favorable results in eight cases. In two cases, there was an increase in symptoms, with a slight rise of temperature so that it was discontinued.

The *milk of thyroidectomized goats* and compressed tablets of the same ("Rodagen") have been used with varying, although on the whole rather disappointing, results. Edmunds,⁶ however, who had previously re-

¹ New York Medical Journal, April 3, 1909.

² West Virginia Medical Journal, September, 1909.

³ Illinois State Medical Society, May 18, 1909; Journal of the American Medical Association, June 19, 1909.

⁴ Therapeut. Monatshefte, July, 1909.

⁵ Loc. cit.

⁶ Lancet, April 9, 1909.

ported favorable results with the former in 3 cases, now reports 7 additional cases, of which all but 2 showed improvement. The administration of the *extract of the thymus gland* has been emphasized by Vetelsen,¹ who uses it alone, alternating with or combined with sodium phosphate. He is undecided whether the thymus extract or the sodium phosphate should be given the preference. The former is given in doses of from 2 to 4 tablets a day, while of the sodium phosphate 15 grains are administered in solution four times daily. If a tendency to diarrhea is set up by this dose, it may be reduced, or the potassium salt substituted for it. The manner of its action is unknown; it may act only as an eliminant, and so reduce the toxemia.

According to Rainear,² the following forms of *electrical energy* have been used in the treatment of exophthalmic goitre: The direct current, the static wave current, the high frequency current, and the Röntgen rays. Each seems to have given good results in special cases. Improvement is noted in from two to six weeks, and positive and decided improvement is seen in 70 per cent. of cases. The treatment by *electrolysis*—the insertion into the gland of needles attached to the cathode—seems to be rational, though there is considerable question of its being practical.

Jordan³ places these methods in two groups—those for treating the whole body, and those for treating the thyroid gland locally. The first are useful adjuncts, but will hardly of themselves bring about a cure. Galvanic and sinusoidal currents have been mostly used. Local applications again fall into two groups—those which stimulate the thyroid gland, and those which diminish the secretory activity of the gland. For the first, the galvanic current has been mostly used, although the sinusoidal method has given about the same results. These often do good for a while, but the improvement soon comes to a standstill. Then other methods may be used—one, the so-called static wave discharge; another, more or less similar, with the use of the Faradic coil. Of the methods to diminish the functional activity of the thyroid, the best known are *electrolysis* and the *Röntgen rays*. For the first a steel needle is used; this is made the positive pole. This, on being inserted into the gland, deposits a little oxide of iron, which causes a leukocytosis and fibrous tissue formation. If the needle is made the negative pole, caustic soda is deposited, which is also followed by atrophy of the gland. The *x-rays* give the best results on the cardiac symptoms. Only one portion of the gland is exposed at a time. Improvement is manifested early, and is of a sedative type. The reduction in the size of the goitre is less uniform. The exophthalmos is the most obstinate.

¹ Norsk Magazin for Laegevidenskaben, January, 1909.

² American Medicine, March, 1909.

³ Clinical Journal, August 11, 1909.

Newman¹ reports the beneficial action of *sour milk* in a case of exophthalmic goitre, which had resisted other forms of treatment. Slight improvement had been noted after exposure to the x-rays.

INFANTILE SCURVY.

Etiology. Concetti,² after reporting two cases of infantile scurvy and reviewing other cases previously reported, concludes that the disease is caused by a toxic condition, with its origin in great part from the alimentary tract. The disturbance may occur while the child is nursing from the breast as the result of overfeeding, the overabundance of certain ingredients in the milk, or of irregular feeding. It may also result from auto-intoxication of the mother, from hereditary syphilis, from any of the acute infectious processes in the child, or from a special predisposition in the child. However this may be, the disease is seen more frequently in children who are nourished on food prepared in a manner which does not conform to the physiological type, and such diet continued for a comparatively long time. Koplik³ believes that scurvy may develop in any infant whose food is, or has been, constructed upon "denutritional" lines.

Lister⁴ places the present views of etiology of this disease under two heads—(1) the positive and (2) the negative. According to the first, the cause is an error in diet, by which some deleterious substance is given in the diet; according to the second, the error in diet consists in withholding something beneficial. Supports may be offered for both views. The disease, at any rate, develops in certain, but not all, children who have been fed for some time upon sterilized milk. The tendency to the disease seems to increase with the addition of certain prepared foods, which again require boiling before use. Many children, however, on a similar diet will show no signs of scurvy or malnutrition.

Russell⁵ calls attention to the probability of lime starvation being the fundamental disorder in the etiology of infantile and adult scurvy, rickets, scrofula, and tuberculosis. Three facts suggest a common cause for rickets and infantile scurvy: (1) The two diseases are very frequently present in the same infant; (2) both diseases occur most often in artificially fed infants; (3) the administration of acid food (raw milk and fruit juice) acts as a specific in infantile scurvy. In rickets, the symptoms due to changes in the bones are most striking, while in scurvy, the symptoms due to changes in the bloodvessels and blood are more characteristic. These differences are only relative, and are due to differences

¹ Lancet, November 27, 1909.

² Archiv f. Kinderheilk., April 17, 1909.

³ Archives of Diagnosis, January, 1909.

⁴ Medical Press and Circular, July 21, 1909.

⁵ Medical Record, December 18, 1909.

in the degree of lime starvation. Scurvy is an acute disease, and results when the supply of lime is entirely cut off. This causes changes in the bloodvessels permitting the transudation of blood, which is further aggravated by the changes in the blood, especially in the lessening of its coagulability. Rickets is a chronic disease, and the result of a lesser degree of lime starvation. In this disease, the bloodvessel walls are affected, but the changes are not extensive enough to allow transudation of blood. It therefore follows that rickets may occur without scurvy, but it is inconceivable that scurvy should occur without some degree of rickets. The deficiency in the diet in either scurvy or rickets is a lessened power of activation of the rennet symogen of the gastric juice. This may be due to insufficient hydrochloric acid in the secretion of the stomach, or the absence of some substance, probably citric acid, in the food. This latter substance is found in normal human and cow's milk. It is destroyed or rendered inert by too great dilution of the milk with water, the addition of alkalies, and by heating.

The conception that adult scurvy is caused by lime starvation receives support from (1) symptoms which point to changes in the bones (2) lack of power to repair injury, and (3) the character of foods which act as specific remedies in the treatment of this disease. Most foods show an acid reaction. Foods which are acid and contain lime phosphate and casein, such as undiluted raw milk, or are acid and contain both lime phosphate and rennet, such as raw meats and blood together, are certain antiscorbutics. It would then appear that lime starvation is an important menace to health. The following deductions are drawn:

1. Lime phosphate is essential for the growth of cells. It is therefore necessary for the normal structure of organs and the repair of injury.

2. Without the action of rennet, the combination of lime and casein suitable for the physiological needs of the body is not produced.

3. Lack of such lime combination is the cause of many diseases.

Symptoms. The disease occurs during the months of the first dentition, nearly 80 per cent. of the cases being between the ages of six and ten months. It is characterized by tenderness of the limbs, with swellings on the shafts of the long bones. This may be followed by marked contractures and deformities. The other symptoms are variable, such as purple discoloration or hemorrhages from the gums, although the latter may be wanting in very young children who have no teeth; subcutaneous hemorrhages in the form of purpura or petechia, and bleeding from the nose, stomach, bowels, or kidneys. Hematuria may be the first or, in some, the only symptom of the disease. There is often fever in moderate degree, but more or less dependent upon the degree of subperiosteal or subcutaneous hemorrhage. Exophthalmos occasionally occurs, due to orbital subperiosteal bleeding, and depression of the sternum caused by separation of the costochondral joint. The child is usually flabby and anemic, although not necessarily wasted. The

bones of the lower limbs are more frequently involved than are those of the arms.

Koplik¹ calls attention to the early signs of the disease. These include the development of a mild anemia, with slight pain in the bones and joints only elicited by pressure or manipulation, the appearance of blood in the excretions or under the periosteum, and the slow eruption of the teeth. Many of these signs have been interpreted as being due to rickets. Such infants may be rachitic, but the tenderness especially is scorbutic. The correctness of this diagnosis is the rapid response of such infants to a change in the diet to one of antiscorbutic character.

In the diagnosis of the fully developed condition, the following diseases should be differentiated: (1) Syphilitic epiphysitis; (2) pseudoparalysis; (3) traumatism; (4) sarcoma; (5) osteomyelitis; (6) acute rheumatism; (7) simple stomatitis.

The chief points upon which the diagnosis depends are: (1) Tenderness of the limbs; (2) age; (3) nature of the diet for some months; (4) history of development of the lesions; (5) nature of the swellings on the shafts of the bones; (6) purple discolorations, or bleeding from the gums of teeth which are at or approaching eruption; (7) effects of antiscorbutic diet.

Prognosis. The prognosis is in general favorable, provided the disease is correctly diagnosticated and properly treated.

Treatment. The preventive measures include the use of fresh milk from a reliable source, or the addition of fresh organic food to the dietary when the food is cooked. These same measures are of even greater importance after symptoms have developed. The administration of the juice of rare meat, sour substances, especially the juice of oranges, lemons, and white grapes is to be further emphasized. These measures all tend to limit the intestinal intoxication. Elimination is to be encouraged.

PURPURA HEMORRHAGICA.

Etiology. No distinct advance has been made in the knowledge of the etiology of this form of purpura during the past year; possibly fewer cases of this type are being reported than previously, as many of these are now placed under the class of symptomatic purpura. Several cases have been reported during the year in which various pathological conditions were present, but in which their etiological relation was very obscure. They are therefore discussed under this head. Elliot² discusses the very rapid form, described under the name "*purpura fulminans*," in some detail, in the attempt to discover some one etiological factor. This type is probably similar to, but an extreme type of, purpura hemorrhagica.

¹ Archives of Diagnosis, January, 1909.

² Archives of Internal Medicine, April 15, 1909.

The number of cases reported as purpura fulminans up to the present time total 56, of which 32 were reported as purpura fulminans, 10 as rapidly fatal cases of purpura hemorrhagica, 8 as various forms of skin gangrene, and 1 as a "rare sequela of scarlet fever." Elliot reports a case of his own, in a girl, aged eight and one-half years, developing seventeen days after the onset of a mild scarlet fever, which proved fatal sixty-eight hours after the first appearance of purpura and twenty-two days following the onset of scarlet fever. His summary follows:

Of the patients in these 56 cases, there were 32 males, 15 females, and in 9 the sex was not mentioned; 47 cases occurred under ten years, one at six months and one at sixty-two years. Predisposing causes were mentioned in 24 cases; scarlet fever, 11 times; diarrhoea, 3 times; anemia measles, and exposure, each 2; vaccination, rheumatism, cervical adenitis, and septic infection, each once. In 32 cases, no predisposing cause was mentioned; in 17 cases, it was definitely stated that the patient was apparently healthy up to the onset of the purpura. Of the 17 cases in which a predisposing cause was mentioned, in 1 the purpura occurred immediately, in 5 within one week, and in all within three weeks of the predisposing factor.

Of the 56 cases, 52 died and 4 recovered. Of the 52 fatal cases, the average course of the disease was fifty-two and one-half hours from the first appearance of the purpura, the shortest period was five hours, the longest ten days. Nineteen cases were fatal within twenty-four hours; in 10, death occurred on the second day; in 7, on the third day; in 10, on the fourth day; in 7, the exact time is not given.

There were extensive ecchymoses, covering large areas of skin, in 39 cases. In 8, there were innumerable small spots scattered over the body surface; these included 6 of the most rapidly fatal cases. A symmetrical distribution of the lesions was noted 19 times; skin gangrene, 8 times; the occurrences of bullæ, 9 times; extreme general pallor, 13 times. Pain, occurring at the site of the individual purpuric spots and preceding their appearance, was noted in 12 cases. Hemorrhages in the mucous membrane were reported in 18 cases; from the nose, 12; mouth, 4; stomach, 3; intestines, 5; genito-urinary tract, 4; conjunctiva, 2; and lungs, 1. Angina occurred in 9 cases, cervical adenitis in 5, and convulsions in 3. The mental state remained clear until near the fatal termination in a remarkably large proportion of the cases.

Autopsies were held in 20 cases. Aside from a general anemia of the organs in most cases, and visceral hemorrhages in 9 cases, there was a remarkable absence of any gross pathological change, and nothing that would suggest a possible cause for this affection. Cerebral hemorrhage occurred three times. In only 1 case was the spleen found markedly enlarged. In 2 cases of symmetrical gangrene, the arteries leading to the gangrenous areas were carefully dissected out and were found to be free from any gross pathological change. Postmortem

cultures were made in 4 cases, twice with negative results; once streptococci were found in all the organs, and once staphylococci were grown from a cardiac puncture taken forty-five minutes after death, but this was looked upon as a contamination.

"From a consideration of the above characteristics of this affection it would appear that purpura fulminans does not differ essentially from the other forms of purpura; it is a difference in degree only. In purpura fulminans the chemical reaction is complete, the reagent has been added in excess, and the disease progresses with overwhelming finality, whereas, in the less severe forms of purpura the chemical reaction is less complete, the reagent has not been added in excess, and the disease is aborted."

Mayer¹ reports a case of acute fatal purpura hemorrhagica, suggesting an infective origin. His findings may be expressed in the following summary:

"1. The recently extravasated blood of this case of malignant purpura hemorrhagica contained in its leukocytes bacilli having the cultural and other characters usually ascribed to the colon bacillus.

"2. The bacilli isolated either from the fresh or from the old blood had the power, on intraperitoneal injection into guinea-pigs, not only to kill the animals in a few hours, but to produce on the wall of the animal's intestines and stomach purpuric patches identical in appearance with those that characterized the disease in the human body.

"3. This power to produce purpuric patches on the walls of the intestines of the injected animal was striking and constant, even after the bacillus had passed through four series of guinea-pigs.

"4. This power was diminished in the cultures that had been kept for eight days or more in the incubator, although the keeping of the cultures fourteen days in the incubator did not lessen the pathogenicity of the bacillus.

"5. The white rat, though more resistant to the first cultures of this bacillus, succumbed in exactly the same way as the guinea-pig when injected with the bacillus that had been through four guinea-pigs.

"6. The colon bacillus, although usually fatal to injected guinea-pigs, does not kill so quickly and does not cause the appearance of purpuric patches on the intestinal and stomach walls of the injected animals."

Prichard² reports a case of purpura following the use of fibrolysin. The patient was a man, aged sixty-nine years, with Dupuytren's contraction of both palms. Injections of 2.3 c.c. of fibrolysin were given about every three days for 18 injections, and the palms were massaged every day. This plan gave some improvement. After about seven weeks of treatment, the patient had a slight epistaxis, followed by bleeding from the gums and a few purpuric spots on the legs. Calcium chloride was administered without any result. The condition increased,

¹ Medical Record, March 26, 1909.

² Lancet, August 14, 1909.

and a hematuria was added to the picture. The temperature was normal, the pulse increased to 90, was regular, and at first of high tension; later, this gradually declined, the pulse became irregular, and death occurred. The patient had been a diabetic, but, at the time treatment was begun, the urine was free from sugar; it did, however, contain a trace of albumin. With the first appearance of the purpura, the sugar rose to 8 grains per ounce. The question is suggested as to whether the diabetic condition had produced a special vulnerability to fibrolysin.

The role of syphilis in the etiology of this disease has been suggested. Several cases have been reported during the past year, which makes this seem possible. Paronzini¹ reports the case of a girl of eight whose foster mother had been a syphilitic. The girl had been given specific treatment at the age of four on account of ulceration of the gums. Four years later she developed purpura, which also yielded to vigorous mercurial treatment, applied externally, with the internal administration of potassium iodide.

Sabrozes and Duperie² report the case of an infant, aged eight hours, with fissures at the corners of the mouth, who succumbed to edema and hemorrhagic effusions into the liver, spleen, adrenals, lungs, and skin. These lesions contained spirochetes to the exclusion of other organisms, the hemorrhages being due to the rupture of distended capillaries resulting from obstruction by the interstitial granulomatous lesions in the organ. The thymus was sclerotic, the kidney glomeruli and pancreas showed signs of irritation, and the myocardium and vasa vasorum of the great vessels contained spirochetes. This relation of hemorrhages to hereditary syphilis has been observed by Levaditi, and the reporters look upon this case as giving a clear demonstration of the mechanical origin of the edemas and hemorrhages.

Bernart³ reports another interesting case of purpura hemorrhagica in which syphilis seemed to bear an etiological role. Here the hemorrhagic eruption was confined to the distribution of nerves coming from a special portion of the spinal cord, which was the situation of a syphilitic process; in other words, it involved the legs with the upper margin of the lesion at the position of a line drawn from trochanter to trochanter; there were a few scattered lesions up over the buttocks. Most of the spots were oblong in shape, and all assumed a horizontal position. They were not of a deep ecchymotic color, but had a mottled appearance. The eruption was thought to be due to the toxic influence of potassium iodide on an area supplied by a nerve the site of a syphilitic lesion, as it occurred only after the administration of this drug.

¹ *Gazetta degli Ospedali*, February 14, 1909.

² *Arch. d. mal. d. Cœur, etc.*, 1909, vol. v, p. 257.

³ *Chicago Medical Recorder*, August, 1909.

HENOC'S PURPURA.

This form of purpura was first described by Henoch in 1874, when he pointed out the association of purpuric symptoms with intestinal colic, vomiting, intestinal hemorrhages, and occasionally painful swellings in the joints. Of the several cases reported during the last year, two seem worthy of mention as of particular interest.

Lett¹ reports the case of a boy, aged three years, in which the purpuric condition was complicated by intussusception, a differential diagnosis of which is usually attended with considerable difficulty on account of the abdominal symptoms usually present in this form of purpura. He had been perfectly well until the onset of a mild diarrhea; this was followed the same evening by pain and swelling in the left knee, and later in the left elbow. The next morning there was swelling of the scrotum, and of both legs, and severe abdominal pains. In the afternoon one or two purple watery blisters were seen on the swollen left leg; the following day a diagnosis of intussusception was made, an operation was performed, and the intussusception reduced. After the operation, the purpura increased; there was a passage of blood per anum three days later, and four days later another intussusception occurred, followed by death.

The *differential diagnosis between* this form of *purpura* and *intussusception* is often difficult. The former occurs usually in children over three years of age, while the later is seen more frequently in babies. Aside from this, the differentiation between the two conditions will rest upon the presence of an abdominal tumor in intussusception, kidney- or sausage-shaped, tender, and painful upon manipulation, and with the attacks of pain becoming more definite in outline. Where purpura and intussusception occur coincidently, the diagnosis is even more difficult.

Don² reports a case of Henoch's *purpura associated with angioneurotic edema* in a boy, aged eight and one-half years. The illness began with swelling of the left knee and ankle, and dysentery. Soon after this there developed small subcutaneous hemorrhages, irregular in outline and size, more frequent on the legs and arms, but also appearing upon the body and face. Later, edematous swellings of penis and scrotum appeared, with erythematous patches over the right hip and the front of the right forearm, raised up like urticarial lesions, but not itchy, and pitting upon pressure. A painful, sausage-shaped tumor also appeared in the course of the descending colon, which partly subsided without bowel movement and completely disappeared after a number of copious evacuations, the last few of which contained almost pure blood. Several new joints were involved and some new hemorrhages appeared. After an illness of about eighteen days improvement set in and continued to complete

¹ Lancet, February 20, 1909.

² Ibid., August 21, 1909.

recovery, which for fourteen months had been without recurrence. Don agrees with Osler as to an explanation for the co-existence of purpura and angioneurotic edema. The latter believes that both may depend upon "some poison—an alkaloid—possibly the result of some faulty chylipoietic metabolism, which, in varying doses in different constitutions, excites in one urticaria, in a second peliosis rheumatica, and in a third a fatal form of purpura." With this view of the etiology, careful dieting with the administration of intestinal antiseptics following eliminative measures would seem to be indicated. Surgical interference should rarely be necessary, as the edema of the bowel is transient and there is no tendency to gangrene.

HEMOPHILIA.

This subject has been one of considerable interest during the past year, especially in connection with the various work upon serum diagnosis and treatment.

The general subject is well discussed by McCausland.¹ He defines hemophilia as consisting of an unusual tendency for excessive and persistent hemorrhage to occur either spontaneously or as the result of trauma. These hemorrhages may take place from the mucous membranes and skin, or subcutaneously in the joints and deeper tissues.

Etiology. The etiological factors which predispose to or produce hemophilia are obscure, except that of hereditary transmission. The majority of cases occur in families, being transmitted through the female members, although occurring more frequently in the males. Direct transmissions from father to son and the occurrence of the disease in females are rare, although instances do occur. Some cases seem to arise *de novo*. The condition appears to be somewhat more prevalent in the Jewish race, while negroes are unusually exempt.

Symptoms.—As a rule, the symptoms appear in early life, although occasionally the first hemorrhage may be after puberty. During childhood, circumcision, cutting the teeth, and small accidents may start severe hemorrhages. Later on, the infectious diseases may be very severe and the rashes become hemorrhagic. Vaccination, however, is usually unattended with any risk. The tendency to hemorrhage varies at different times, and its occurrence in one part of the body seems to predispose to its appearance in others at the same time. Of the hemorrhages, epistaxis is the most common, followed in turn by hemorrhages from the mouth and teeth, external traumatic hemorrhages, hematuria, hematemesis, and malena.

The lesions in the joints usually appear in more than one at a time, the

¹ Dublin Journal of Medical Sciences, September, 1909.

joint becoming painful, hot, swollen, and the tissues over it reddened. This may be followed by a rise in temperature and pulse rate. Preceding these various hemorrhages there may be the sensation of plethora, a feeling of well-being, etc. Insanity is quite common in these patients, and is usually of a melancholic type.

Pathology. Aside from the direct results of the loss of blood, there seems to be nothing particularly distinctive or characteristic in the pathology of this disease. The extreme anemia of the organs and tissues of the body, with localized areas of necrosis in different organs, subcutaneous and peritoneal hemorrhages, or hemorrhages into the different hollow viscera, might all be accounted for by the loss of blood and the want of nutrition. The changes in the joints may be placed under three heads, depending upon their age: (1) Hemarthrosis—the exudation of blood into the joint cavity; (2) arthritis—the result of organization of the clot and the fibrous union to greater or less extent of the articular surfaces; erosion of the cartilage and lipping of the joint may finally lead to (3) articular deformity. The heart may be small, which was interpreted by Virchow as a causative factor in the disease, but now looked upon as the result of lack of development due to poor nutrition. The changes described in the vessels—insufficiency of the muscular coat and an unduly rich capillary network—are not constant.

Blood. No constant change, morphologically or chemically, has been found in the blood in hemophilia. Some cases show a slight eosinophilia. The general opinion that calcium salts and the fibrin-forming substances are deficient in the blood seems to rest upon insufficient data. The clotting time of the blood seems to be about normal, or not sufficiently delayed to account for the symptoms. The formed clot is, however, softer and less elastic than normal, and it exudes very little serum. After a hemorrhage, the blood may fail to clot at all, which is quite the reverse to what occurs in the normal individual. The blood platelets or hemopoietic organs have not been adequately studied.

Wolf and Henry,¹ after a review of the various theories of coagulation of the blood in their relation to hemophilia, consider the theory as proposed by Wolf the most satisfactory at the present time, although doubt exists about many of its details. Fibrinogen and thrombogen, both probably of hepatic origin, unite with the substance thrombozyme found in the leukocytes, blood plates, and endothelial cells. This combination yields thrombin, which is in reality soluble fibrin; this, with the calcium salts, produces coagulation. It is further assumed that antibodies, probably also formed in the liver, are at work retarding clotting. Hemophilia may therefore be looked upon as due to an abnormal increase of these antibodies, rather than to a diminution or absence of the other elements, as formerly supposed. This is substantiated by experiments

¹ *Revue de Médecine*, December, 1909.

upon hemophiliacs who show normal amounts of fibrin, calcium, blood plates, and leukocytes.

Of the theories thus far proposed to explain the etiology of this condition, none are properly substantiated or satisfactory. They are: (1) Virchow's theory that the disease is due to a hypoplasia of the heart and larger vessels. (2) A disproportion between the bulk of the blood and the capacity of the vascular system. (3) Chemical changes in the blood. (4) Toxemia or some alteration in the nerve supply to the bloodvessels.

Treatment. This consists first of all in avoiding trauma of every form, whether accidental or surgical. If an operation becomes absolutely necessary, calcium chloride should be given for some time before, although the value of this is even doubtful. After the hemorrhage is once established, local measures should be adopted. These include the application of the various styptics, some of which seem to be effective in one case and not in the next.

The *serum treatment* of this disease has been occupying a prominent place in the last few years. Wirth¹ has reviewed 45 articles upon the subject of internal methods of hemostasis, with special emphasis upon the use of serum in hemophilia. He finds that very good results have been obtained by the subcutaneous or intravenous injection of fresh animal serum, according to the method inaugurated by Weil. Twenty cases have been reported in which injection of serum arrested hemophilic hemorrhage more or less completely. The effect of the serum does not last over a month. The local action of the serum is also considerable, so that repetitions of the injections often become unnecessary. Wirth has treated twenty-three cases of hemorrhage from various causes with the method, which he describes in detail, and is convinced that the injections of serum are actually an efficient means for the treatment of hemorrhage in hemophiliacs.

The method is especially indicated in those affections in which the coagulating power of the blood is reduced, although it may prove effectual in other forms of hemorrhage. As a rule, 20 c.c. of serum is enough, but 40 c.c. may be injected without harm. The subcutaneous method is to be preferred, unless the symptoms are urgent, when intravenous injections may be used. Horse serum seems preferable, and ordinary diphtheria antitoxin can be used. It may also be used locally applied to the bleeding point.

Gangani² found it necessary to supplement diphtheria antitoxin with fresh rabbit serum to control a severe hemorrhage in a boy, aged four years. He is convinced that failures in the experience of others are due to the fact that the serum used was too old, or modified in some way. The injection of 10 or 20 c.c. of serum as fresh as possible should be

¹ Centralbl. f. Grenzgebiete der Med. und Chir., vol. xii, No. 5 to 7.

² Gazzetta degli Ospedali, June 13, 1909.

repeated. He injected 20 c.c. of antitoxin and 75 c.c. of rabbit serum in the course of eighteen days in the case reported.

Baum¹ reports the use of serum in three clinical cases of hemophilic hemorrhage. In one, the hemorrhage was arrested by the injection of serum after the failure of tamponing, adrenalin, and the thermocautery. The hemorrhage had persisted for two days, but stopped in a few minutes after two local applications of tampons dipped in fresh diphtheria antitoxin. Examination of the blood at the time and later showed normal coagulation, so that the hemorrhage had evidently been the result of some transient dyscrasia. The serum treatment in the other cases was disappointing. The patients were children known to be hemophiliacs.

Trembur² reports the case of a girl, aged thirteen years, who had been a "bleeder" since the age of five, during which time she had several excessive hemorrhages. In February, 1909, a menacing hemorrhage occurred from the mouth, left ear, throat, and gums. The hemoglobin was 50 per cent.; the red cells, 3,280,000; and the leukocytes, 8437. There was a severe epistaxis a day or two later while the child was lying quietly in bed. About 5 c.c. of sheep's serum was then injected into the left upper arm, and four hours later the epistaxis was arrested. It recurred two days later, but was checked by local application of the serum. Slight hemorrhages occurred later from the gums and ears. Ten c.c. of serum was injected into each thigh, the injections repeated two weeks later, and 19 c.c. injected into the abdomen three weeks later; the child received 106 c.c. of serum between February 20 and May 1, 1909, when she left the hospital in good health, having gained twenty pounds. Trembur explains the beneficial effect of the serum injections as due to the marked leukocytosis which follows each injection, by which the number of ferment-bearing cells are increased. No precipitins for sheep or rabbit serum could be discovered in the child's blood during or after the injections.

DIABETES MELLITUS.

The Pathology and Pathogenesis of Diabetes. THE PATHOLOGICAL ANATOMY OF THE PANCREAS IN DIABETES. As far back as 1788, Cawley reported a case of diabetes associated with pancreatic disease, but it required the now celebrated experiments of von Mering and Minkowski, performed about twenty years ago, to seriously direct attention to the probable importance of the pancreas in the production of diabetes mellitus. As is well known, these investigators demonstrated that extirpation of the pancreas in dogs was invariably followed by true diabetes.

¹ Mitt. a. d. Grenzgeb. der. med. u. Chir., April 10, 1909.

² Ibid., November 20, 1909.

Since that time, not only the experimental relationship of the pancreas to diabetes, but also the pathological anatomy of that organ in diabetes has been the occasion of much study and some controversy. To the pathology of this subject Cecil¹ has recently added a contribution of distinct value, representing as it does accurate observations upon the changes in the pancreas in no less than 90 cases of diabetes mellitus.

In only 25 per cent. of Cecil's series could the pancreas be regarded as small or atrophic. The average weight was 94 grams, which corresponds closely to the normal weight, generally given as 97 grams. Fatty infiltration of the organ could be made out in 15 cases, but no instances were observed in which the pancreas was the seat of calculi, cysts, cancer, or hemorrhage.

The microscopic examination of the pancreas in these cases of diabetes afforded some interesting and suggestive results. In 64 of the 90 cases, there existed a definite chronic interacinar pancreatitis, in 21 of which the sclerosis was marked. The older the patient, the greater the frequency with which interacinar sclerosis was found. It was present in 90 per cent. of the cases over thirty years of age.

The interlobular type of pancreatic sclerosis was of rare occurrence, being present in only 4 cases.

Compression and atrophy of the acini were the dominant changes noted in the secreting parenchyma. In this way entire acini were often destroyed, to be replaced by connective tissue.

The most significant observation made by Cecil was that he could demonstrate definite anatomical changes in the islands of Langerhans in 88 per cent. of his 90 cases. Fibrosis of the islands was the lesion most often met with; in 40 cases it was only moderate, but in 36 it was advanced. After sclerosis, the most frequent lesion observed affecting the islands of Langerhans was hyaline degeneration. This condition appeared in 30 per cent. of cases, and occurred most often after the fortieth year. Leukocytic infiltration about the island was noted in but 9 cases.

The character of the lesion affecting the islands of Langerhans has apparently a distinct bearing upon the duration of a case of diabetes. With insular sclerosis, the average duration of the disease was found to be three years and eleven months; with hyaline degeneration, it was three years and a half; whereas in leukocytic infiltration about the islands it was only eleven months.

Out of the entire series, there were only 11 cases in which anatomical lesions of the pancreas, either macroscopic or microscopic, could not be discovered. Ten of this group were under thirty-five years of age.

Associated with the pancreatic changes, Cecil has found definite lesions in other organs in certain of his cases. Chronic interacinar

¹ Journal of Experimental Medicine, March 1, 1909.

pancreatitis was accompanied by cirrhosis of the liver in 7 cases, and by chronic interstitial nephritis in 25 cases. Marked hemochromatosis was observed in two of the cirrhosis cases, in which the islands of the pancreas exhibited fibrous encapsulation and the deposition of iron pigment in the insular cells. Chronic pancreatitis with insular sclerosis occurred in one of the cases of diabetes complicated by exophthalmic goitre. In two cases, in which adenomata of the thyroid gland occurred, adenoma-like hypertrophy of the islands of Langerhans was also noted. Cecil also observed a remarkable instance of acromegaly accompanied by diabetes, in which a similar adenoma-like hypertrophy of the islands co-existed with adenoma of the pituitary body. In another case, calcification of the pituitary gland was associated with marked chronic inflammatory change of the pancreas and fibrosis of the islands. In one case of diabetes with myxedema, he found sclerosis of the islands of Langerhans and chronic interacinar sclerosis.

From these significant pathological observations Cecil believes that it is not too much to assume, first, that the lesions found in the islands of Langerhans are of such a nature as to interfere with the proper performance of the function of these cells; and secondly, that because of the variety of lesion involving these structures in diabetes, these lesions of the islands of Langerhans are primary and not secondary to diabetes. That the relationship between lesions of the islands of Langerhans and diabetes is no mere accident, is strongly suggested by the fact that in 12 of this series of diabetes, partial or complete destruction of the islands of Langerhans existed without demonstrable changes in the pancreatic parenchyma.

Marked pancreatic changes in diabetes are also reported by Heijl.¹ At the autopsy of a man who had diabetes, and who was also an alcoholic, there was found, in addition to cirrhosis of the liver and widespread degenerative changes in the pancreas, marked destructive lesions of nearly all the islands of Langerhans. From this and other cases, Heijl is led to advance the opinion that alcohol is the primary factor in inducing changes in the pancreas, which in time are responsible for the diabetes.

This belief is in accord with that held by Simmonds,² who contends that in cases of glycosuria associated with cirrhosis of the liver, pancreatic changes and hemochromatosis, the so-called "diabeté bronzé" of the French, the common etiological factor is the long-continued use of alcohol to excess. He substantiates this view by reporting two typical cases of hepatic cirrhosis accompanied by glycosuria and hemochromatosis, and five other somewhat less typical cases of the same order.

The Relation of the Islands of Langerhans to Glycosuria. In spite of the researches of Opie and others, there are those who are by no means

¹ Hygiea, vol. lxxxi, No. 3.

² Berliner klin. Woch., vol. xlv, No. 12.

satisfied that the islands of Langerhans exert a specific influence upon the carbohydrate metabolism, but hold rather that it is the injury to the entire pancreas that is responsible for the glycosuria in certain cases of pancreatic disease. MacCallum¹ has conducted a careful experiment with the view of demonstrating specific control of the carbohydrate metabolism by the islands of Langerhans.

The pancreas of a dog was ligated in such a way as to allow nearly two thirds to remain in normal condition, while the remainder, with its duct ligated, was allowed to atrophy. After this operation, the dog's urine was absolutely sugar-free. Seven months later a second operation was performed. At this time the isolated portion of the pancreas was found to have undergone extreme atrophy, while the remainder was quite normal. This normal mass was then completely extirpated, the dog retaining only the atrophic third of his pancreas. Two days after this second operation the urine contained, for the first time, a considerable quantity of sugar. Forty-eight hours later the glycosuria had disappeared, and the dog's urine from then on remained sugar-free, except when 40 grams or over of dextrose was administered at one dose. It was estimated that this dog, possessing only an atrophic remnant of a pancreas, could assimilate 38.5 grams of dextrose at any one time. At a third operation, the atrophic remains were also removed. For the next three days a marked, but steadily diminishing glycosuria was observed. Whether or not this glycosuria would ultimately have disappeared is a matter of speculation, for when the sugar elimination had decreased from 23.3 grams to 5.1 grams a fourth operation was undertaken, at which the thyroid was extirpated, but the two larger parathyroids were left intact. From then until the animal's death, which occurred in three days, there was never a trace of sugar in the urine. It is of interest to note that the portion of the pancreas which underwent atrophy was found, upon examination, to be composed of enlarged islands of Langerhans and the remains of pancreatic ducts. Although, as MacCallum admits, the result of the experiment is not as clean cut and conclusive as might be desired, it is at least highly suggestive. The fact that after most of the pancreas was removed, an atrophic portion of that organ, largely composed of hypertrophied islands of Langerhans, was capable of warding off glycosuria, even when considerable quantities of sugar were ingested, points strongly to the truth of the assumption that in themselves the islands of Langerhans exert some powerful influence upon the carbohydrate metabolism.

Symmers² has studied the fat content of the islands of Langerhans in 73 unselected autopsies. Out of this series, only two cases suffered from diabetes mellitus during life, and in neither could he demonstrate

¹ Johns Hopkins Hospital Bulletin, September, 1909.

² Archives of Internal Medicine, May, 1909.

fat or any other pathological change in the islands of Langerhans. He found, however, that decided fat accumulation occurred more often in alcoholic than in non-alcoholic subjects. Out of 32 alcoholics, 75 per cent. showed excessive fat in the islands of Langerhans. In view of the fact that alimentary glycosuria and intolerance for sugar are most frequently noted in persons who are free users of alcohol, Symmers suggests that the occurrence of fat in the islands of Langerhans in alcoholics may offer an explanation of this intolerance.

Pancreatic Diabetes. Forschbach¹ has performed some unique experiments in an effort to determine how pancreatic diabetes in a dog is influenced by parabiosis with a normal dog. After a detailed account of the complicated technique of this operation, and a complete tabulation of the results of his experiments, he draws certain conclusions. These are, in part, that if the pancreas of one of two dogs living in parabiosis is totally extirpated, there soon occurs in the pancreatectomized dog not only a temporary amelioration of symptoms, as, for example, a diminution of the glycosuria, but the wound heals well, the cachexia disappears, and the general condition of the dog resembles that of the healthy animal. In short, the dog from whom the entire pancreas was removed acted like the one upon whom only partial pancreatectomy had been performed. He believes that, in such a procedure, these results indicate that the fundamental metabolic disturbance has been reached. He thinks the most important factor in lessening the glycosuria in the pancreatectomized dog is the probable passage of some antidiabetic principle from the healthy to the abnormal dog. If such is the case, it is evident that the antidiabetic substance must be conveyed by means of the blood and lymph stream, since the transfer of nervous impulses is out of the question in these investigations.

LIPEMIA IN PANCREATIC DIABETES. The occurrence of lipemia, and the quantity of lipid substance in the blood and liver in pancreatic diabetes, has been studied by Leo.² He found that in dogs, after extirpation of the pancreas, there was usually a noteworthy increase in the amount of lipid substance in an ethereal extract of the blood, as compared to that found in normal dogs, or in those who had suffered only partial extirpation of the pancreas. This increase, however, was never very great, rarely amounting to a frank lipemia. The lecithin content was, as a rule, proportionate to the increase in the total ethereal extract of the blood. On the other hand, the cholesterin content of the blood was inconstant, and, as a rule, no difference could be observed between the amounts found in normal and pancreatectomized dogs. He also noted that, in dogs whose pancreas had been removed, there occurred an extraordinary increase of fat in the ethereal extract of the liver, which was participated in by both cholesterin and lecithin.

¹ Archiv f. experim. Path. u. Therapie, Band lx, p. 131.

² Archiv f. exper. Path. u. Pharm., Band lxi, p. 1.

Adler¹ has also contributed to our knowledge of diabetic lipemia. He believes that these lipemias occur with an acidosis, and are more cholesterinemias than lecithinemias. A chloroform extract of fat obtained from the blood of one case bore this out, for it showed the presence of 17.03 grams of cholesterin and 1.19 grams of lecithin. In a second case, he obtained 11.08 grams of cholesterin, and only the faintest trace of lecithin.

Diabetes from Infectious Pancreatitis. In a previous issue of *PROGRESSIVE MEDICINE* (June 1, 1909), attention was called to the observations of Hirschfeld² upon the probable infectious origin of certain cases of diabetes. That author has collected several additional cases of a similar nature, and now goes farther and advances an explanation for the occurrence of diabetes after acute infection. He contends that frequently, as the result of some infectious process, a pancreatitis is set up. This begins subacutely, and at the outset is rarely recognized clinically, but finally, becoming chronic, it gives rise to a diabetes of pancreatic origin. He explains the cases of post-infectious glycosuria, which last only a comparatively short time, by assuming them to be the result of an acute transient pancreatitis.

Hirschfeld's view receives striking confirmation in a case of pancreatic glycosuria, occurring ten years after typhoid fever, which is reported by Cammidge.³ The patient was a man, aged fifty-one years, who had always enjoyed excellent health except for an attack of typhoid fever in 1898. Ten years later 3 per cent. of sugar was accidentally found in his urine. He had absolutely none of the constitutional symptoms of diabetes, and his physical examination was quite negative. Cammidge found that his urine contained a considerable quantity of dextrorotary fermentable sugar, and gave a positive "pancreatic" reaction. This suggested to him the possibility of the glycosuria being associated with pancreatic disease. Further examination of the urine indicated the presence of a low-grade catarrhal inflammation of the upper part of the small intestines and biliary tract. Bacteriological examination of the feces revealed the presence of a small number of typhoid bacilli. As a result of these examinations, Cammidge believed that he was justified in assuming that this glycosuria depended upon a typhoidal pancreatitis, the result of a latent infection of the bile ducts by the typhoid bacilli, persisting years after the patient had recovered from the disease itself.

The Relation of the Adrenals to Glycosuria. The mechanism of adrenalin glycosuria has been experimentally investigated by Straub.⁴ He induced glycosuria by prolonged intravenous injection of adrenalin in a definite quantity. As a result of his investigations, he has come to regard adrenalin glycosuria as the outcome of some process which regulates the giving up of sugar to the circulating blood, rather than to

¹ Berliner klin. Woch., 1909, No. 31.

² Deutsche med. Woch., 1909, No. 4.

³ Lancet, June 19, 1909.

⁴ Münchener med. Woch., 1909, No. 10.

any alteration in the process of sugar formation. He further contends that, inasmuch as adrenalin acts upon the sympathetics as a vasoconstrictor, and in view of the fact that "puncture diabetes" is conceded to occur through the action of the sympathetics, it is more than probable that adrenalin glycosuria is also due to some sympathetic influence. By means of the sympathetics, adrenalin, on the one hand, raises the blood-vessel tone, and, on the other, it increases the sugar tone of the blood. This mechanism, under pathological conditions with abnormal adrenalin activity, results in an adrenalin glycosuria, whereas, under normal conditions, it regulates the cleavage and delivery of sugar. In conclusion, he states that he is as yet unable to agree with the results of the recent experiments of Eppinger, Falta, and Rudinger, which showed that after extirpation of the thyroids, injection of adrenalin failed to bring about glycosuria, and questions the relationship claimed to exist between the thyroids and suprarenals. He is inclined to think that their results could be more correctly attributed to an acute narcotic poisoning of the sympathetics.

During the course of their researches upon the antagonism that exists between the pancreas and adrenals, Glaessner and E. P. Pick¹ have been able to show that it is possible to inhibit adrenalin glycosuria in rabbits and dogs by means of coincident injection of pancreatic juice from men and dogs. Witte-peptone produced the same result. In large doses, adrenalin lessened or entirely prevented pancreatic secretion, and the amount of glycosuria that resulted therefrom was in direct proportion to the diminution of the pancreatic secretion. They also observed that, in animals with pancreatic fistulæ, the adrenals showed an almost complete absence of the chromaffin substance, as well as changes in the medullary cells.

As the result of a series of experiments performed upon dogs, in an effort to determine what relation the thyroid and adrenals bore toward pancreatic glycosuria, Stone² came to the following conclusions:

1. "That the parathyroids play so important a part in carbohydrate metabolism that the simultaneous removal of the pancreas and thyroids, when the parathyroids are not considered, can give no conclusive results.
2. "That nothing definite can be proved concerning the interrelation of the pancreas and adrenals by their simultaneous removal.
3. "That removal of the adrenals greatly increased the activity of the pancreas, at least with regard to its external secretion.
4. "That the injection of secretin after removal of the adrenals gives a more marked result than while the adrenals are in place.
5. "That the pancreas is completely under the control of hormones. The hormone called secretin actively stimulates, and, apparently, the hormone of the adrenals inhibits its activity."

¹ Zeitschrift f. experimental Path. u. Therapie, Band vi, Heft 2.

² University of Pennsylvania Medical Bulletin, June, 1909.

The work which led to this last conclusion is worthy of especial note, since it represents one of the earliest records of the complete control of an organ by two separate hormones.

Relation of the Thyroid to Glycosuria. Since the elaborate experiments of Eppinger, Falta, and Rudinger,¹ already briefly referred to, and those of sundry other observers, much interest has been manifested over the interrelationship of the ductless glands. Grey and de Sautelle² have now contributed additional information concerning the relationship of the thyroid gland to glycosuria. They produced glycosuria in two groups of dogs, in one group by prolonged ether anesthesia, and in the other by intraperitoneal injection of 1 to 1000 adrenalin chloride solution, and then noted the amount of dextrose eliminated. The thyroid glands of all the dogs were removed, and again glycosuria was induced by means of ether or adrenalin. The results showed that, in thyroidless dogs, the amount of the glycosuria caused by ether or adrenalin was decidedly less than that produced in normal animals. They further demonstrated that when thyroidless dogs are fed upon powdered thyroid gland and treated with ether or adrenalin, the glycosuria again increases, this increase being proportionate to the amount of thyroid ingested. A similar increase of the ether or adrenalin glycosuria was noted when the thyroid gland was allowed to regenerate for six weeks. These experiments corroborate the view that the function of the pancreas, which enables it to oxidize the sugar in the body, is held in check by the secretion of the thyroid gland, and that removal of this inhibitory influence permits of increased functional activity of the pancreas, as shown by the decreased sugar elimination after thyroidectomy.

Thyroidectomy in Alimentary Glycosuria. McCurdy³ has tested the effect of removing the thyroid gland of dogs upon alimentary glycosuria—the parathyroids being left intact. After the glycosuria induced in these animals had lasted some days, the thyroids were extirpated. There rapidly followed a decrease in the sugar elimination until the assimilation limit for dextrose had risen sufficiently to render the urine sugar free. This result persisted permanently when the parathyroids were left intact. McCurdy believes that, normally, the thyroid probably inhibits the direct combustion of sugar in the muscles.

Diabetes and Exophthalmic Goitre. Diabetes has been observed, from time to time, associated with Graves' disease. Murray⁴ reports four instances in which exophthalmic goitre was accompanied or followed by diabetes. In one case, marked diabetes developed while the patient was apparently recovering from an attack of exophthalmic goitre of three years' duration. In another case, diabetes first appeared after

¹ *Zeit. f. klin. Med.*, 1908, lxi, 1.

² *Journal of Experimental Medicine*, September 2, 1909, No. 5.

³ *Journal of Experimental Medicine*, 1909, No. 6.

⁴ *Clinical Journal*, July 28, 1909.

the exophthalmic goitre had existed for eleven years. A third patient gave the first evidence of diabetes during a recurrence of Graves' disease. The fourth case was less conclusive, since the patient had entirely recovered from the exophthalmic goitre before diabetes developed, and at autopsy this diabetes was shown to have been due to a pancreatitis in which all the islands of Langerhans had been destroyed. The clinical occurrence of diabetes with exophthalmic goitre is surely in accord with the above-mentioned experimental evidence of the influence of the thyroid upon glycosuria.

The Influence of the Thyroid upon Carbohydrate Destruction. The clinical and experimental evidence of thyroid influence upon carbohydrate metabolism has been strikingly confirmed by the ingenious work of King.¹ He employed the juice extracted from muscle, pancreas, and thyroid, much after the technique of Cohnheim, in order to eliminate the confusing effect of other organs upon the action of the thyroid, a difficulty which cannot be obviated in experimentation upon the living animals. Definite quantities of mixed pancreatic and muscle juice were mixed with a known amount of dextrose, and after incubation for five and one-half hours the amount of dextrose destroyed was calculated. When thyroid juice was added to a similar mixture of muscle, pancreatic juice, and dextrose, there occurred, after incubation, a decided diminution in the amount of dextrose destroyed. King further observed that this action of the thyroid was not attributable to a ferment, but was due to some thermostable substance, since juices obtained from thoroughly boiled thyroid glands produced the same result. Moreover, he found that in all likelihood this stable substance was iodothyron, the active principle of the thyroid, because it alone was capable of inhibiting the carbohydrate-destroying mechanism to even a greater degree than the whole thyroid gland. Finally, inasmuch as any possible influence from other ductless glands and the nervous system had been removed in these experiments, King concludes that they indicate the existence of a direct antagonism between the thyroid and the carbohydrate-destroying mechanism.

Metabolism in Diabetes. Lusk,² in his Harvey Lecture, has admirably reviewed the various phases of metabolism in diabetes. At the outset he defines diabetes mellitus as "a condition in which the power to burn sugar within the organism is partly or completely destroyed." He clearly distinguishes diabetes from conditions of glycosuria which result from reducing or overtaxing the ability of certain organs to hold sugar.

Lusk points out that, in grave diabetes mellitus in man, the ability to burn dextrose is completely lost, and that in such an individual, therefore, existence is maintained at the expense of protein and fat

¹ Journal of Experimental Medicine, September 2, 1909.

² Archiv f. Internal Medicine, May, 1909.

which become the sole supply of his potential energy. It is the fat metabolism which forms the chief source of life for the diabetic, because the majority of the ingested protein in these patients is converted into sugar, which, since it cannot be consumed, is eliminated in the urine, carrying with it most of the available potential energy of protein. It has been shown that in diabetes, on the average, 45 per cent. of sugar may be produced from protein, but this sugar production may at times reach almost 60 per cent.

Lusk states that the physiological heat value of protein in diabetes is only 19 per cent., since protein yields during its metabolism 28.5 per cent. of its energy as free heat, and 52.5 per cent. more of its energy is eliminated by the diabetic as urinary sugar. He suggests that, in view of this fact, the three to fivefold increase in protein metabolism, noted in dogs with phloridzin and pancreatic diabetes, is probably a compensating process. From his own experiments, he found that when glycosuria was induced there was little change in the fat metabolism, whereas there did occur an increase in the protein metabolism in order to offset the caloric loss occasioned by the elimination of sugar in the urine.

After a thorough discussion of proteid metabolism, Lusk turns to a consideration of the origin of the fatty acid, beta-oxybutyric acid and its derivatives, the acetone bodies. He concurs in the generally accepted view that these substances are, for the most part, derived from the breaking down of certain fatty acids, and agrees with Knoop as to the way this is accomplished, namely, "that the oxidation of fatty acids in the body is effected by an attack on the fatty molecule at the carbon in the beta-position." Lusk explains that beta-oxybutyric acid can only be formed from those fatty acids containing an even number of carbon atoms. It is for such fatty acids that the individual exhibits a preference.

Lusk further emphasizes the fact that the formation of beta-oxybutyric acid does not alone depend upon the metabolism of fat, but also results from the breaking down of many of the amino-acids of protein.

He expresses a belief that there exists a specific beta-oxybutyric acid ferment, comparable to the sugar splitting ferment, which performs the final cleavage of the fatty molecule that results in the production of the acetone bodies. The wide individual variation noted in the occurrence of these acetone bodies he believes can be accounted for by assuming that this ferment is either inhibited or absent.

Finally, he sums up his conception of the perversion of metabolism in diabetes with this remark: "Sugar cannot burn, fat burns only as far as beta-oxybutyric acid, and as for protein, a part of its amino-acids are converted into sugar, and another part into beta-oxybutyric acid, neither of which can be burned."

NON-DIABETIC GLYCOSURIA. Glaessner¹ has divided the glycosurias into two groups—the glycosuria in which grape sugar, the sugar that is

¹ Wiener klin. Woch., 1909, No. 26.

normally present in the blood, escapes, and those in which the other sugars and closely allied bodies are excreted. The first group deals with glycosuria in its narrower sense, that is, glycosuria associated with hyperglycemia, as, for example, alimentary glycosuria, toxic glycosuria, and functional glycosuria. The second group includes levulosuria, lactosuria, galactosuria, pentosuria, and the elimination of glycuronic acid, conditions which, broadly speaking, may also be regarded as glycosuria. He also calls attention to an important differential point between the glycosuria of diabetes and the transient glycosuria that may result from asphyxia, carbon monoxide poisoning, and exposure to cold. In true diabetes he has never found lactic acid in the urine, whereas in the latter forms of glycosuria he has always observed its presence.

RESPIRATORY METABOLISM IN GLYCOSURIA. La Franca¹ carried out some investigations with the view of determining the comparative respiratory metabolism in various forms of experimental glycosuria. For this purpose he produced phloridzin, pancreatic and adrenal glycosuria in several series of dogs. He found that both the excretion of carbon dioxide and the consumption of oxygen were lessened in phloridzin diabetes, whereas in the other two forms of glycosuria they increased. He has tabulated his results, as follows:

Form of glycosuria.	Respiratory quotient.	Excretion of carbon dioxide.	Absorption of oxygen.
Pancreatic glycosuria.	Lowered.	Increased.	Increased.
Adrenalin glycosuria.	Unchanged.	Increased.	Increased.
Phloridzin glycosuria.	Lowered.	Decreased.	Decreased.

The work of Lüthje upon the influence of external temperature upon glycosuria has recently been gone over and confirmed by Busquel.² Busquel made his observations upon three diabetic patients, subjecting them to varying temperatures and estimating the average sugar excretion in the urine for twenty-four hours. The results are shown in the following table:

	At 11° C., or 51° F.	At 20° C., or 68° F.
Patient I	25.9 grams glucose in 24 hours.	17 grams glucose in 24 hours.
Patient II	19.9 grams glucose in 24 hours.	13 grams glucose in 24 hours.
Patient III	17.9 grams glucose in 24 hours.	11 grams glucose in 24 hours.

From this it is evident that external temperature has a decided effect upon the amount of sugar eliminated in the urine. When the patients were kept warm the urinary sugar decreased, and the converse was true when they were surrounded by cooler air.

He draws the obviously practical deduction from his work that diabetics should avoid cold, and should live as far as possible in a warm temperature.

¹ Zeitschrift f. exper. Path. u. Therap., Band vi, Heft 1.

² Presse Médical, 1909, No. 3.

THE CONVERSION OF CARBOHYDRATE INTO FAT. A theory has been advanced from time to time by certain observers, notably Pavy, that carbohydrate may be converted into fat. Knight¹ set about the task of proving or disproving this view by feeding goats and rabbits on a diet that was almost fat-free, but rich in carbohydrates. After these animals had existed on such a diet for about one month, they were killed and the amount of fat found in the mucous membrane of their small intestines was calculated. Knight believes that his results failed to confirm Pavy's theory, as little fat could be secured from the intestinal mucous membrane in spite of the rich carbohydrate diet.

GLYCEMIA IN PANCREATIC DIABETES. Hesse and Mohr² have studied the question of glycemia in dogs with pancreatic diabetes, the result of total extirpation of that organ. They found that, in animals suffering from pancreatic diabetes, the sugar content of the blood could be raised far above the normal limit without sugar being eliminated through healthy kidneys. This observation entirely agrees with findings of a similar nature that have been noted in diabetes occurring in man.

TOXICITY OF GLUCOSE. Süssenguth³ injected grape sugar into animals without being able to observe any noteworthy toxic effects. He found that the normal glycogen relations were not affected at all in the way that they are in diabetes. Although he freely concedes that the results obtained from such animal experiments may not always be directly applicable to man, yet he feels that his results at least throw some reasonable doubt upon the role which has so frequently been ascribed to the grape sugar of the diabetic.

ANTITRYPSIN IN THE BLOOD OF DIABETICS. From a series of careful investigations upon the antitryptic content of the blood in diabetics, Marcus⁴ has shown that there is a decrease in the antitrypsin, provided the diabetes is not complicated by such grave conditions as nephritis, psoriasis, and severe cachexia. This lowering of the antitryptic content, to his mind, is not explained either by an increase of antitrypsin excreted in the urine or by the elimination of trypsin through the urine. He found, further, that in all his cases the amount of sugar excreted varied inversely with the quantity of antitrypsin present in the blood. This has led him to believe that in diabetics there must exist a definite relationship between these two factors. Moreover, it suggested to him a therapeutic possibility. Inasmuch as ferments stimulate the formation of corresponding antiferments, it seemed probable that the decrease of antitrypsin in diabetes might be corrected by the ingestion of trypsin. It was shown, however, that this hoped-for result was not obtained by the ingestion of pancreatin. On the other hand, the direct ingestion of anti-

¹ Intercolonial Medical Journal of Australasia, July, 1909.

² Zeit. f. exper. Path. u. Therapie, Band vi, Heft 1.

³ Berliner klin. Woch., 1909, No. 28.

⁴ Zeit. f. exper. Path. u. Therapie, Band vi, Heft 3.

trypsin gave more encouraging results. Marcus employed a liquid preparation of Merck's known as "*leucofermatin*," which is said to more than double the antitryptic content of the blood of a healthy man. He injected this subcutaneously into diabetics, and found that as the anti-trypsin in the blood gradually rose to above normal there occurred not only a decided improvement in all the objective and subjective symptoms, but also a noteworthy decrease in the sugar elimination.

THE GLYCOLYTIC ENZYME IN THE PANCREAS. Stoklasa¹ has studied the glycolytic enzyme derived from the pancreas. He found that an enzyme can be obtained which breaks up the disaccharides with the production of carbon dioxide. From his tabulated results, it appears that maltose is split up the best, saccharose almost as well, but lactose not so completely as the others. He has also shown that, when this enzyme acts upon maltose, considerable lactic acid is produced; that less lactic acid results from the breaking down of saccharose, and still less from lactose. On the other hand, the latter yields more ethyl alcohol than does maltose, while saccharose produces less than either of the other disaccharides. This glycolytic pancreatic enzyme does not, however, possess the power of breaking down the hexoses, as glucose, fructose, and galactose when they are introduced as such.

SODIUM CHLORIDE GLYCOSURIA. Burnett² has conducted experiments with rabbits upon the production and inhibition of sodium chloride glycosuria. He showed that when rabbits were injected with a pure solution of sodium chloride, they promptly developed a glycosuria. He also demonstrated that this glycosuria was inhibited, or, at least, lessened, if potassium chloride or calcium chloride was added to the salt solution injected. The explanation of these phenomena is based upon the fact that the injurious action of pure sodium chloride injections is twofold; on the one hand, they cause cytolysis, and, on the other, a degenerative change known as "black disintegration." The first destructive process is inhibited by calcium chloride, whereas the second is counteracted by potassium chloride. When, however, injections of a combination of sodium and potassium chloride were followed by mixed injection of calcium and sodium chloride, glycosuria occurred, and any previously existing glycosuria was increased.

THE EFFECT OF PREGNANCY UPON THE TOLERANCE FOR SUGAR. The frequency with which glycosuria has been observed in pregnancy led Reichenstein³ to investigate the tolerance for sugar in 93 pregnant women. He found that they exhibited a marked decrease in their tolerance for sugars, as a result of which they were prone to develop both glycosuria and alimentary levulosuria. His explanation for this is purely hypothetical, based as it is upon an alleged interaction between

¹ Zeit. f. physiologische chem., Band lxii, Heft 1.

² Journal of Biological Chemistry, December, 1909.

³ Wiener klin. Woch., 1909, No. 42.

the internal secretion of the ovaries and that of the various organs, as the pancreas, adrenals, thyroid, and liver, which are concerned in the metabolism of carbohydrates.

Acidosis. Although its occurrence has been noted in sundry conditions other than diabetes, acid intoxication is observed in its most pronounced form in that disease. Furthermore, since its production is closely associated with certain perversions of metabolism incident to diabetes, it may not be amiss to review briefly some of the recent contributions to our knowledge of acidosis.

The most complete review of the entire subject of acidosis, in all its complex phases, has been furnished by Ewing¹ in his Cartwright Lecture for 1908. To attempt to summarize the mass of opinions correlated and assembled by this writer would be well-nigh impossible, as well as beyond the scope of this article. To those interested in the history of the theory of acid intoxication and its experimental basis, or in the pathology, physiology, physiological chemistry, and the clinical aspects of acidosis, as well as in a complete bibliography of the subject, Ewing's paper can be heartily recommended.

It may be of interest, however, to cite certain personal opinions of this author, based as they are upon his exhaustive study in this field of work. He believes that adequate grounds have been furnished, so far as experimental work on the theory of acidosis and chemical studies of diabetes are concerned, to justify the conclusion that the coma of diabetes is the outcome of acid intoxication, but that clinical evidence upon this point is far from satisfactory. He points out that, in many diabetics with severe acidosis, coma fails to develop, whereas typical coma may occur in other conditions than diabetes, and even in diabetes when little or no acidosis exists. In view of these irreconcilable facts, he is compelled to question the correctness of assuming an exclusively acid origin of diabetic coma, and inclines rather to the belief that the acidosis is only one of a number of factors responsible for this coma.

In speaking of the origin of the acetone compounds, he agrees with others in believing that in the body they are largely derived from fat tissues and to a limited extent from the food, but that, in diabetes, protein also contributes to their formation. He is in accord with Lusk² in his opinion that straight-chain fatty acids which contain an even number of carbon atoms, at least four in number, undergo oxidation at the beta-carbon atom, and may yield beta-oxybutyric acid.

Spriggs³ has contributed another noteworthy review of acidosis. At the outset this writer points out that acidosis is the result of any metabolic disturbance, which tends to diminish the alkalinity of the tissues and their juices. The body is naturally protected against considerable

¹ Archives of Internal Medicine, November and December, 1908.

² Loc. cit.

³ Quarterly Journal of Medicine, April, 1909.

quantities of acid, whether ingested, or produced within the body by perversion of metabolism, by two sets of neutralizing bases: first, the sodium of the body fluids, the potassium of the cells, and the alkali earths of the bones; and second, the ammonia derived from protein hydrolysis. When, for any reason, the amount of acid in the body becomes too great to be neutralized in the above ways, the normally faintly alkaline reaction of the tissue fluids becomes altered, and a condition of acid intoxication may supervene.

He mentions five *tests* by which he believes the presence of acidosis may be determined: (1) The presence of an excess of acids in the urine; (2) the presence of acetone in the urine or on the breath; (3) the facility with which the urine of an individual may be rendered alkaline. He asserts that, in patients who are producing an excess of acid in the body, 8 grams of sodium bicarbonate, which when ingested by mouth renders the urine of a normal individual alkaline for about twenty-four hours, fails to alkalinize the urine because it combines with the acid radicles and is eliminated as neutral salts; (4) the reduction of the alkalinity of the blood; (5) finally, he holds that the amount of ammonia in the urine is a valuable index of the presence and degree of acid poisoning.

He also takes up in detail the clinical conditions in which acidosis may be suspected. Preëminently among these stands diabetes mellitus, a disease in which Spriggs regards the presence of acid poisoning as definitely proved, both from a chemical and a clinical standpoint. He looks upon the coma of diabetes as the supreme manifestation of such intoxication. He emphasizes the fact that the production of large quantities of organic acids in this disease depends primarily upon the inability of the diabetic to use carbodydrates. He also makes the statement that the administration of large doses of sodium bicarbonate is of such distinct advantage in advanced diabetes that it may ward off a threatening coma, a fact which to his mind amply confirms the conclusion that severe diabetes is a condition of acid intoxication. The accuracy of this assumption may be doubted in view of the opinion entertained by certain other observers, notably Ewing,¹ who points out that in recent years the reported failures of the alkali treatment of severe acidosis and diabetic coma far outnumber the successes, and that, on the whole, the alkali treatment of coma has been attended by signal disappointment.

Among other clinical manifestations of acid intoxication, Spriggs includes post-anesthetic poisoning, especially found in children after chloroform anesthesia, and the recurrent, or so-called cyclic, vomiting of children. In addition, he mentions the toxemic vomiting of pregnancy, puerperal eclampsia, acute yellow atrophy of the liver, phosphorus poisoning, uremia, and scurvy as diseased conditions which have been attributed, from time to time, to acid intoxication.

¹ Loc. cit.

IS DIABETIC COMA DUE TO ACIDOSIS? The majority of clinicians doubtless agree with Spriggs in regarding diabetic coma as the outcome of an acidosis; there are, however, those who, like Ewing, doubt whether this doctrine should be accepted unconditionally. Stark,¹ for example, maintains that the acidosis theory of diabetic coma is untenable, although it must be admitted that his objections are based almost entirely upon clinical evidence. He reasons that it is unjustifiable to assume acidosis to be the cause of coma, because diabetic coma has often been observed without any evidence of acidosis being present; besides, acidosis has been noted in a large group of such diverse conditions, such as eclampsia, acute yellow atrophy, gastro-intestinal disorders, toxemic vomiting of pregnancy, and in poisoning from anesthetics and various minerals; furthermore, acidosis sometimes occurs in healthy individuals who are on a carbohydrate-free diet, as well as in starvation, and various conditions of inanition; and, in addition, he asserts that a coma almost identical with diabetic coma may occur in certain acute infections. His greatest and final argument against the acidosis theory is, that the administration of alkalies has proved utterly worthless, both as a preventive and curative measure in diabetic coma.

THE CAUSE OF DECREASED CARBON DIOXIDE IN THE BLOOD IN COMA. In their experimental studies upon the relation of acidosis and diabetic coma to the carbon dioxide content of the blood, Beddard, Pembrey, and Spriggs² have arrived at conclusions diametrically opposed to certain views upon this subject advocated by Pavy. Pavy maintained that the acidosis of diabetes reduces the bases in the blood and tissue fluids available for combination with carbon dioxide, so that the blood is able to take up and remove less carbon dioxide than normally, hence carbon dioxide accumulated in the tissues. If this theory of carbon dioxide accumulation be true, then, of necessity, it follows that the tension of carbon dioxide in the tissues will be raised, and that such carbon dioxide as the blood does take up will exist in the blood under an increased tension.

Beddard, Pembrey, and Spriggs allege to have disproved this theory, since they believe they have demonstrated that, in diabetic coma, the carbon dioxide tension in the tissues is not raised, therefore there is no accumulation of carbon dioxide in the tissues; and that, in acidosis, the tension of carbonic acid in the blood, instead of being raised, is actually lowered, even to a fifth of its normal tension; and that this decrease is greatest during coma. In addition, they have shown that the blood is not even saturated for this abnormally low carbon dioxide tension, and that, in coma, the blood is still capable of combining with a great deal more carbon dioxide than it actually contains in this condition. It is admitted by all that in acidosis and coma the quantity of carbon dioxide in the blood is progressively reduced, but the primary cause of this

¹ Medical Record, November 13, 1909.

² Lancet, June 19, 1909.

reduction is not, as has heretofore been believed, the inability of the blood to take up more carbon dioxide than it is found to contain, but rather that there is a diminution in the formation of carbon dioxide by the body. According to these observers, as the ability of the tissues to neutralize the acid products of metabolism steadily fails, their activity decreases, and, as a result, less carbon dioxide is produced. They demonstrated that decreased carbon dioxide content of the blood preceded coma by many days, and persisted for some time after coma had disappeared.

POSTMORTEM FINDINGS IN ACIDOSIS. Moorhead¹ had the opportunity of performing an autopsy upon an unusual fatal case of acid intoxication, which occurred in a girl, aged sixteen years, who suffered from a large cystic goitre and was myxedematous. Her goitre was partially removed and she made a satisfactory postoperative recovery, except for several slight attacks of tetany. Over a month after her operation, while in apparently good health and while on a normal mixed diet, without any discoverable cause she suddenly developed severe headaches, passed into coma and collapse, and died in forty-eight hours. Her urine, which previously was known to have been normal, the day before her death gave an intense acetone and diacetic acid reaction. A carefully performed autopsy failed to disclose any explanation for this sudden fatal acidosis. All the organs, including the liver, pancreas, and gastrointestinal tract, were normal, except for slight parenchymatous inflammation of the kidneys and a minute abscess cavity containing a little inspissated pus that was found in the remaining lobe of the cystic thyroid. The parathyroids were not found at the autopsy, in spite of a careful search for them. Moorhead reports a second case, in which a rapidly fatal acidosis occurred in a woman, aged twenty-eight years, who, after suffering from nausea for a month, in a few days developed symptoms of collapse, cyanosis, drowsiness, and coma, without any evidence of organic lesions.

POSTANESTHETIC ACIDOSIS. The occurrence of postanesthetic acidosis has already been referred to. Some observations upon the frequency and occurrence of this condition, in the patients who came under his charge, have been made by Gundrum.² He concludes that a certain proportion of all cases of surgical anesthesia are followed by an acidosis, shown by the occurrence of acetone, and, less often, diacetic acid in the urine. He found that the appearance of acidosis did not depend upon the character and amount of the anesthetic used, or upon the character and duration of the operation. He believes that starvation and digestive disturbances are not responsible for the condition, but that postoperative acidosis is more apt to occur in emotional individuals than in the more phlegmatic.

¹ Practitioner, September, 1909.

² Johns Hopkins Hospital Bulletin, June, 1909.

Hamblen,¹ working along much the same lines, found acetonuria in 50 per cent. of a series of patients that had been subjected to ether anesthesia of varying duration. In 31.6 per cent. of his series, he found acetone in the urine only after the ether anesthesia. This has led him to lay considerable stress upon ether as a factor in the production of this acidosis. He found that, in his experience, three days was the average duration of postoperative acetonuria, whereas six days was the longest time which he observed it to persist.

The Geographical Distribution of Diabetes. From an elaborate series of statistical studies upon the occurrence of diabetes, Williamson² reaches the conclusion that, taken the world over, diabetes is gradually increasing in frequency. He finds, too, that there is a wide variation in the frequency with which diabetes occurs in different parts of the world. Although by no means an ideal method, because of its evident inaccuracies, he has used the mortality from diabetes per 100,000 in a given country as his index of the frequency of this disease. Thus, he finds the average mortality in England to be 9.6. On the continent of Europe it varies from 4.5 in Italy, to 15.8 in Copenhagen, 20 in Berlin, and 25.8 in Bordeaux. In the United States, the general average is 13.9; in Australia, 8; and in Cuba, 2.8. In Asia, the mortality is only 0.15 in Hong Kong, while in Calcutta it is 9.2.

THE INCIDENCE OF DIABETES IN NEW YORK CITY. Barringer,³ following a more accurate method, has made some striking observations upon the incidence of glycosuria and diabetes in New York City between the years 1902 and 1907. From the medical records of one of New York's large life insurance companies, he found that, out of a total of 71,729 adults examined by this company during the five years above mentioned, there were 2043 men, or 2840 per 100,000, whose urine contained glucose on one or more examinations. Of these, 681 showed between 1 per cent. and 12 per cent., and 1362 less than 1 per cent., of sugar. By assuming the existence of true diabetes only in those who had 1 or more per cent. of sugar in their urine, he finds the incidence of diabetes to be 950 per 100,000 population. When, however, he considers that 50 per cent. of the 1362 cases of slight glycosuria may ultimately become diabetic, his final estimate of the incidence of diabetes in New York City reaches the appalling figure of 1895 cases per 100,000 of population.

Increasing Death Rate in Diabetes and the Possibility of Preventing the Disease. From the report of the Registrar-General and other statistics, Williamson⁴ shows that not only in England is the death rate from diabetes steadily increasing, but that the same is true for the United States,

¹ University of Pennsylvania Medical Bulletin, June, 1909.

² Münch. med. Woch., 1909, No. 41.

³ Archives of Internal Medicine, May, 1909.

⁴ Practitioner, April, 1909.

Germany, France, and Denmark. This increase holds for both males and females. In England, for example, in 1887 the death rate from diabetes in males was 75 per million living, and, in the same year, in females it was 51 per million. In 1906 it had risen to 104 per million in males, and to 90 per million in females.

From a critical study of the etiology of 250 cases of diabetes occurring in his own practice, Williamson comes to the conclusion that when certain predisposing factors exist, the adoption of various prophylactic measures offers some hope of preventing, or at least postponing, the onset of this disease. Among the etiological factors which he believes indicate special predisposition toward diabetes and call for the exercise of unusual precaution are: a family history of diabetes; belonging to the Jewish race; gout and obesity early in life; mental strain, worry, and hard work; pelvic operations in obese women after the menopause; transient glycosuria, especially when this develops during pregnancy; the persistent overingestion of alcohol and starchy food, and the occurrence of a persistent slight glycosuria.

The Significance of Glycosuria in Pregnancy. In view of the fact that Williamson lays considerable stress upon the occurrence of glycosuria during pregnancy, it is interesting to note the observations upon this point made by Williams,¹ which are based upon his own large experience and a study of the cases in literature. Out of 3000 consecutive obstetrical cases in the Johns Hopkins Hospital, he found that sugar, recorded only when Fehling's solution gave a definite reduction, had been demonstrated either during pregnancy, labor, or the puerperium in 167 patients, or 5.57 per cent. of the cases. He has been led to conclude that a positive reaction to Fehling's solution during pregnancy is usually due to lactosuria or transient, alimentary, or recurrent glycosuria, and does not necessarily indicate the existence of diabetes; that lactosuria is without clinical significance; that glycosuria, if it appears late in pregnancy, is 2 per cent. or less, and is unaccompanied by symptoms, is usually of slight clinical importance; and that pregnancy may occur in true diabetes, or diabetes may first appear during pregnancy, which, in either event, is a serious complication, although the prognosis is less grave than was formerly supposed. He believes that pregnancy should be terminated if a large amount of sugar appears in the urine, and when such glycosuria is not amenable to dietetic and medical measures.

Diabetes in Children. Diabetes is a much less frequent disease in children than in adults. Forty-three cases of diabetes in young children have been collected by Lion and Moreau,² in which they found that in 17 children the disease made its appearance between the ages of eight and twelve years, and in one child it occurred as early as the end of the second

¹ American Journal of the Medical Sciences, January, 1909.

² Archives de Médecine des Enfants, 1909, No. 1.

year. As is the rule in infantile diabetes, the majority of their cases terminated fatally, 37 out of their series dying within one to eight months after the onset of the disease. They call especial attention to the marked tendency of diabetes to attack several members of the same family. Ten of their cases illustrated this. A reliable family history was obtainable in only 18 of their cases, but, of these, considerably over half showed an inherited tendency to the disease.

That the prognosis of diabetes in children is not always rapidly fatal is shown by Landahl,¹ who reports six cases occurring in children from ten months to sixteen years of age. One of these children developed glycosuria at the age of fourteen months, following an acute infection. As the result of careful dieting, the sugar disappeared from the urine, and now, at the age of thirteen, the child is apparently well. Another case, occurring in a boy, aged two years, has been kept in good health, with his urine almost sugar free, for the past three years by means of appropriate dietetic precautions. As this boy grows older his tolerance for carbohydrates slowly increases. Landahl's remaining four cases all terminated fatally, although in all fairness it should be mentioned that they were only seen by him after the disease was well advanced. This author is inclined to believe that the routine examination of the urine in young children would reveal many unsuspected cases of glycosuria, which might be controlled if early treatment were instituted.

Heiman² records a case of diabetes in a boy, aged ten years, whose family history was quite negative as regards this disease. This patient exhibited all the classic symptoms of true diabetes, but, under proper medical and dietetic treatment, his subjective symptoms greatly improved and he was able to take 105 grams of bread in twenty-four hours with impunity. However, as Heiman points out, the ultimate prognosis in this case is extremely doubtful.

Abdominal Crises in Diabetes. A condition of decided interest from a diagnostic standpoint has been observed by Downes and O'Brien.³ They had two patients with diabetes, in whom acute, agonizing, abdominal pain occurred which so closely simulated intestinal obstruction that operation was seriously considered. The first case, suffering from pain of increasing severity in the lower abdomen, distention, and absolute constipation, was about to be operated upon for a supposed intestinal obstruction, when sugar and diacetic acid were found in the urine. Operation was deferred, and shortly afterwards in spite of vigorous alkali treatment, coma supervened. At the necropsy, the gastro-intestinal tract and peritoneal cavity were found to be normal.

The second case was that of a young girl, who, after being on anti-diabetic treatment for some time, developed severe abdominal pain and

¹ Hygiea, August, 1909.

² Archiv. f. Pediatrics, June, 1909.

³ Intercolonial Medical Journal of Australasia, September, 1909.

tenderness, dulness in the lower abdomen, distention, vomiting, leukocytosis, fever, and a pulse of 140. Acute intestinal obstruction was again thought of, but, because of acetone and diacetic acid in the urine and her semicomatose condition, operation was postponed, and alkalies were administered intravenously and otherwise. The wisdom of this course became apparent when, as the signs of acidosis gradually disappeared from the urine, the abdominal symptoms subsided and she promptly recovered.

Gangrene of the Breasts in Diabetes. Swift¹ has reported a case of gangrene of the breast complicating diabetes, in a woman aged sixty-four years, who had been a diabetic for some time. Without any previous injury, she developed fever (102.6° F.) and severe pain in the left breast, which, below and to the outer side of the nipple, showed the presence of a tender, bluish area about one and one-half inches in diameter. Gangrene developed within eight hours, which spread in the course of the next week until there appeared a sloughing area measuring seven by four inches. The slough separated and the wound healed. As long as the gangrenous condition existed, the patient was every ill and had a fever of 100° to 103° F. About a month after the onset of the gangrene her urine was sugar-free, possibly as the result of the fever.

The Treatment of Diabetes. More recent literature has been devoted to the treatment than to any other phase of diabetes mellitus, with the exception of the experimental aspects of the subject. A review of some of the more noteworthy contributions will perhaps best serve to indicate the most accepted methods employed in the management of this disease.

GENERAL MANAGEMENT OF DIABETES. The noted investigator and celebrated authority upon diabetes, Lépine,² drawing upon his rich experience, gives some practical suggestions for the treatment of advanced but uncomplicated diabetes. At the outset he emphasizes the importance of adopting a *cheerful, hopeful tone* toward the ever anxious patient, and suggests the use of the word "*glycosuria*" in place of the dreaded term "diabetes." He says that, in simple cases, the one fundamental indication is to reduce the hyperglycemia. This may often be brought about by such simple means as the taking of light *exercise* and moderate restrictions in the diet. He never allows much muscular exertion unless the general nutrition is good. He has found that, in those who are too heavy, the weight must be reduced, but that, on the whole, the obese cases are easier to manage successfully than the thin ones, in whom every effort has to be made to increase the weight in spite of the fact that sugar must be withdrawn from their diet.

As regards *diet*, he finds that, unless a person is too fat, it is unnecessary to limit meat, so long as the elimination of urea does not amount to more

¹ Australasian Medical Gazette, January, 1909.

² Revue de thérap. méd. Chir., 76th year, Nos. 8 and 9.

than 0.4 gram per kilo of body weight. As far as possible, bread should be replaced by gluten preparations and potatoes. He points out that many fruits are particularly injurious, because of the quality, rather than the quantity, of sugar which they contain. Dates and figs are especially forbidden. Many patients, because of a marked tolerance for levulose, can take cane sugar and honey with surprising impunity. Because of the possibility of sugar being formed from protein, he uses cheese guardedly. Fats, however, may be given freely, provided there is no acetonuria. As a rule, he looks with disfavor upon the use of alcohol. He believes that, if necessary, saccharin may be permitted, but should never be advised. A milk diet is his favorite remedy, when a condition of over-nourishment exists.

Lépine asserts that *drugs* are of no avail, unless associated with suitable dietetic restrictions. He attributes the beneficial effects sometimes obtained from the coal-tar products, quinine, and the salicylates, to a delayed glycogen destruction brought about by these drugs. Opium, which acts through the nervous system, he uses when there is insomnia and pain, rather than the bromides, which are less useful and can only be given for a short time. On the whole, he regards the alkalies as among the most useful drugs in the treatment of diabetes. He has found that cures at various health resorts are sometimes of distinct advantage, inasmuch as they often improve the general condition of a diabetic, even though they have no directly favorable influence upon the glycosuria.

THE DIETETIC TREATMENT OF DIABETES. Weintraud¹ also gives some rules for the dietetic management of severe diabetes. According to this writer, the carbohydrates should never be suddenly withdrawn, but should be gradually reduced a little at a time. This method also affords one a better opportunity to judge of the severity of the case. In addition to the withdrawal of carbohydrates, the protein content and total nutritive value of a diet should be carefully watched. He also lays great stress upon the importance of controlling the nitrogen balance in the dietetic treatment of severe diabetes. He regards a persistent disturbance of the nitrogen balance as of more importance than the degree of acidosis; therefore he urges that a nitrogen balance be established as quickly as possible, without, however, neglecting to decrease the amount of sugar excreted in the urine. The attainment of a nitrogen equilibrium is hastened by including in the regimen of the diabetic occasional "hunger-days," or, at least, protein hunger days. He thinks that a gradual reduction in the amount of protein food should be associated with the reduction in carbohydrates. It should be remembered, however, that for every decrease in the carbohydrates and protein, an increase should occur in the amount of fat ingested. In order to carry out such measures properly, the prolonged control of the diabetic is absolutely

¹ *Therapeutische Monatsschrift*, 1908, No. 12.

essential, although to do this he has not, as a rule, found it necessary to place his cases in sanatoria or hospitals.

The question to be decided in the treatment of diabetes is, according to Rosenfeld,¹ whether or not the patient can oxidize carbohydrates, and, if so, how much carbohydrates can be utilized. He calls attention to the fact, that although in many cases it is possible to restore a sugar-free condition by rigid dieting, the carbohydrate tolerance is not of necessity increased thereby, the only result being a cessation of the glycosuria. He doubts whether there is any decided advantage to be gained in compelling diabetics to live entirely without carbohydrates, or even on a minimum amount of carbohydrate. Except in very early cases, he does not aim to keep his diabetic patients entirely sugar-free, but tries rather to maintain in them only a relatively slight glycosuria.

The difficulties which now surround the treatment of diabetes would, he believes, be largely done away with, could some carbohydrate be discovered which every diabetic was capable of oxidizing, thus obviating the danger of acidosis, which at present attends the withdrawal of carbohydrates. Today, in severe cases with acidosis in which there is danger of coma, he thinks some benefit may be derived from the use of certain carbohydrate acids, as glyconic acid with glycosamin. He is convinced, however, that the most efficient procedure in cases of this type is a preliminary oatmeal cure which, in many instances, results in a decided improvement of the carbohydrate tolerance.

It would be difficult to find a clearer or more complete review of the treatment and general management of diabetes mellitus than that given by Falta² in one of the Harvey Lectures. He defines diabetes as a disturbance of metabolism due to a lack of equilibrium between carbohydrate mobilization and carbohydrate combustion, resulting either from pancreatic insufficiency or overactivity of the chromaffin system, or from both of these causes acting together. Since, however, we are ignorant of the ultimate cause of this disturbance of metabolism, he says that causal therapy is at present out of the question, and that all one can do is to combat the most prominent symptom, the excretion of sugar and its results. This, he states, may theoretically be accomplished in two ways, either by increasing the efficiency of carbohydrate metabolism, a possibility which has been attended with little or no success, or by decreasing the work required of the diseased organ or organs, thus affording them the opportunity to recover. The latter procedure forms the basis of the dietetic therapy of diabetes. At first Falta takes up a small group of cases which show marked disease of the pancreas, and are characterized by a disturbance of the protein and fat digestion, shown by an excess of fat and muscle fiber in the stools, while the carbohydrates

¹ Berliner klin. Woch., 1909, No. 21.

² Archives of Internal Medicine, March, 1909.

are excreted unused in the urine. The indication in this group is to replace the deficient pancreatic secretions. He has been able to accomplish this best by the use of pancreatic extract, administered with sufficient alkalis to overcome the inhibitory action of the acid gastric juice on the pancreas preparation. He found the most successful preparation for this purpose to be the "*pankreatin*" of the Rhenania factory, given in doses of 10 grams in twenty-four hours.

Before considering the dietetic measures by which glycosuria may be diminished, he calls attention to the important fact that complicating conditions, such as acute infections, chronic infectious processes, and gastro-intestinal disturbances, may make it necessary to materially modify a strict dietetic treatment of diabetes. His own experience has convinced him that the disturbance of metabolism in diabetes is very complex, that its intensity is subject to many factors, and that, therefore, each case has its peculiar characteristics and requires especial study before it can be properly managed.

Falta makes it a rule to determine the character of the disease in each case before deciding upon a plan of treatment. To this end every new patient is put upon a *test diet* of known composition for three days, unless signs of severe acidosis are present. The diet is as follows: Meat, 250 grams; butter, 150 grams; 4 eggs; 300 grams of vegetables of low carbohydrate content; white bread, 75 grams; about 4 deciliters of light white wine, and, in addition, tea, bouillon, and coffee. By means of this test diet, and certain formulæ and calculations which are described, he is enabled, at the end of the third day in a given case, to determine the intensity of the glycosuria, whether the sugar eliminated is derived only from the ingested carbohydrate or from protein as well, and to what extent this occurs, and also the degree of acetonuria. In forming an opinion of a case, he also takes into account the age, occupation, surroundings, duration of the diabetes, and the complications.

The *second phase* of Falta's plan of treatment consists in an attempt to *render the patient sugar-free*. In mild cases, the elimination of bread from the test diet usually accomplishes this. If, however, it is not sufficient to withdraw only the carbohydrates, he decreases the nitrogen intake to about 8 grams, and increases the butter ingested to 200 grams, in order to prevent the patient losing weight while becoming sugar-free. If, in spite of this restriction in diet, sugar continues to appear in the urine, Falta tries a vegetable diet for a day or two, or introduces a day of fasting, or employs the oatmeal cure.

While rendering a patient sugar-free, care must be exercised to *prevent the occurrence of acetonuria*, or the increase of such a condition if already present. He accomplishes this by administering alkalis while the carbohydrates are being withdrawn. If a marked acetonuria exists, he has found it advisable to saturate the body at once with large doses of sodium bicarbonate and citrate of sodium until the urine becomes alkaline,

when the dose may be gradually decreased. If the acidosis is so great that it resists alkalies and other non-carbohydrate substances, he resorts to the use of the only efficacious substances, the carbohydrates themselves, care being taken not to increase the hyperglycemia in this way. At the same time, the entire diet must be reduced to a low point, and even the introduction of "hunger days" may be necessary to diminish the acidosis. As soon as the formation of acetone bodies is limited, the carbohydrates should be again decreased cautiously in order to reduce the hyperglycemia.

When *coma* is threatening, Falta gives 100 grams of sodium bicarbonate in twenty-four hours, and puts the sufferer on a diet almost exclusively of carbohydrates. If coma develops, levulose is given subcutaneously, and a liter of 4 per cent. sodium bicarbonate solution is introduced intravenously.

The *third stage* in the treatment of diabetes, as outlined by this author, is to *determine the patient's tolerance*, adopt a diet which will keep him sugar-free, and regulate his mode of living. In order to do this, he keeps him for two weeks on the diet upon which he has become sugar-free, and then, in mild cases, begins with the addition of bread, increasing it gradually until the limit of tolerance is reached. The patient may then be kept upon a diet containing one-half the amount of carbohydrate tolerated.

In the more severe cases in which the protein also has to be reduced in order to abolish the glycosuria, Falta first gradually increases the nitrogen in the diet up to 12 or 14 grams, and then, if the urine remains sugar-free for a month, he guardedly adds carbohydrates.

The cases which cannot be rendered sugar-free either by withdrawal of carbohydrates or by a reduction of protein, and in which the glycosuria disappears only when "hunger days" and the oatmeal cure have been employed, must be managed with the greatest care. He does not dare to add carbohydrates or even increase the proteins in their diet until they have remained sugar-free for many weeks.

Finally, Falta considers certain special measures that may be employed to combat glycosuria. The milk and potato cures he dismisses as being practically without value. He is enthusiastic, however, concerning the excellent results obtained with the "*oatmeal cure*" of von Noorden. He considers this form of treatment applicable to the severe cases of diabetes with acidosis, which it had formerly been impossible to make sugar-free. The essential result of the oatmeal cure, he explains, lies in the fact that by means of it the assimilation of a considerable quantity of carbohydrate is brought about, thus diminishing the acetonuria without increasing the hyperglycemia too much.

Mention should be made of the admirable article on the practical dietetic management of diabetes contributed by Janeway.¹ He says

¹ American Journal of the Medical Sciences, March, 1909.

that the first principle in treatment is a correct diagnosis, which means vastly more than the mere discovery of sugar in the urine. Two points must be determined—first the severity of the glycosuria, or estimation of carbohydrate tolerance, and second, the presence and degree of acidosis. In order to accomplish this, he puts patients upon an accurate test diet largely composed of protein and fat, except in cases of considerable glycosuria. For the latter, because of the danger of precipitating acidosis and coma, three ounces of white bread are added to the diet. His mode of procedure for determining the tolerance and acidosis differs but little from that employed by Falta, which has been described.

Having determined the degree of impairment of carbohydrate metabolism and acidosis, he is able, for all practical purposes, to classify his cases into four groups: (1) The mild cases, those who can take two ounces of bread or more without showing any glycosuria. (2) Those whose tolerance is below this point, but who become sugar-free upon a diet without carbohydrate. These he calls moderately severe cases. (3) The severe cases, the patients who, in addition to the exclusion of carbohydrates, require a decrease of the protein in their diet before their urine becomes sugar-free. (4) The most severe cases which, even on a carbohydrate-free and restricted protein diet, show severe glycosuria and acidosis.

Janeway plans the dietetic treatment of a case according to the class in which it belongs. He believes that all cases should be kept sugar-free, if possible. In the mild cases, which tolerate some carbohydrate, he allows starches up to two-thirds the tolerance limit. The caloric value of the diet for these patients is kept up by means of fat. The diet which he gives contains about 2000 calories in fat, in the form of butter, thick cream, bacon, and cheese. To aid in the digestion of so much fat, he insists upon the necessity of a moderate amount of some dry wine, whisky, or brandy being taken with meals. He places the moderately severe cases upon a strict carbohydrate-free diet, in which the amount of protein is also limited. In this class, he further recommends the occasional interposition of one or two days of very low diet containing but little protein, such as the "hunger days" of Naunyn, or the "green days" of von Noorden.

For the prevention of acidosis, Janeway administers from one-half to one ounce of sodium bicarbonate daily. He is opposed to the common practice of allowing considerable carbohydrate to overcome acidosis, a practice which he believes entirely fails of its purpose. He urges, rather, the restriction of protein in these cases, and recommends occasional "hunger days" as essential.

The diet lists with which he concludes his article are excellent, and are worthy of particular attention, since, unlike most diabetic diets, they are planned to suit the requirements of the American rather than the German stomach.

"Oatmeal Cure" in Diabetes. The now well-known oatmeal cure of von Noorden was discussed in considerable detail in a previous number of this journal.¹ Recent observation confirms the advantages claimed for this special form of dietetic treatment in certain groups of diabetic cases. A. C. Croftan² sums up a considerable experience with the oatmeal diet, with the conclusions that the most brilliant results are obtained in children. Three cases of diabetes in children, which he saw within three weeks after the first symptoms were discovered, he immediately placed upon the oatmeal diet. He now reports these children as altogether well, after a lapse of from three months to three and a half years—one on a general diet, one on a partially restricted diet, and the most recent one on a diet still containing no other carbohydrate but oatmeal. In adults and in adolescence he regards the results obtained as, on the whole, favorable, although he has seen no permanent cessation of glycosuria in these cases when a general mixed diet was resumed.

The rapidly satisfactory results frequently obtained with the oatmeal cure are attributed by Lampé³ to the fact that the diabetic has not lost the power to convert the starch found in oatmeal into glycogen, although this power has been lost more or less for other forms of carbohydrate. It is therefore highly probable that, contrary to what has heretofore been believed, the chemical structure of the starch molecule of different plants is not the same, and that the oatmeal sugar circulating in excess in the blood is handled more easily by the injured cells of the body. This same author has tried the oatmeal diet in 310 cases of diabetes. In the great majority of these cases its use was attended by results decidedly satisfactory in one way or another. He regards this form of treatment as applicable to three classes of cases: (1) Severest diabetes accompanied by marked acetonuria and sugar excretion; (2) cases in which the most restricted diet and "vegetable days" fail to remove the last trace of glycosuria; and (3) those cases which remain sugar-free on a full protein diet. In the last group, two or three days of the oatmeal diet is of advantage occasionally, because it allays the tissue hunger for carbohydrate during the period of rigid protein diet.

Von Noorden,⁴ in a discussion of his oatmeal cure, urges that in suitable cases of diabetes the cure be repeated four or five times a year, as thereby the patients are given an opportunity to assimilate large quantities of carbohydrate, which tends to avert the danger of acidosis. In 28 per cent. of 400 cases treated by this method, he has obtained excellent results. He attributes the success of the oatmeal cure to the fact that along with the oats there is introduced into the body a substance which is capable of directly stimulating the internal secretion of the pancreas

¹ PROGRESSIVE MEDICINE, June, 1909.

² Journal of the American Medical Association, April 24, 1909.

³ Zeitschrift f. diat. und physiol. Therapie, Band xiii, Heft 4.

⁴ Medical Press and Circular, May 5, 1909.

concerned in carbohydrate destruction. In proof of this theory he cites the convincing experimental evidence upon which it is based.

From a study of the influence of various carbohydrates upon the glycosuria of diabetes, Werbitzki¹ concludes that the different carbohydrate substances exercise a different influence upon the sugar excretion, even when they contain one and the same carbohydrate. Oatmeal is especially noteworthy, inasmuch as he found that enormous quantities of carbohydrate in this form failed to cause any increase of the sugar excretion in many diabetics. He also states that the exclusion of all other forms of carbohydrate-containing substances from the diet of diabetics is absolutely essential to the successful use of the oatmeal diet.

A Diabetic Milk. Mayer² has used the diabetic milk, introduced by the Dutch physician Bauma, on a number of cases of diabetes during the last two years. His results have been so successful that he has come to regard this preparation of milk as a valuable adjunct to the dietetic treatment of diabetes. This milk has an agreeable taste, contains 5 per cent. of fat, can be sterilized, and contains a negligible quantity of milk sugar.

A Diabetic Bread. A new diabetic bread has been devised by Cahal.³ This bread, which consists largely of a nut meal, answers all the requirements of most diabetic diets, and, at the same time, is not unpleasant to the patient. One kilogram of bread consists of 400 grams of nut meal mixed with 200 grams of wheat flour, to which 12 grams of sodium bicarbonate and 6 grams of tartaric acid are added, with enough water to make the required amount of dough. Whereas ordinary bread contains 60 grams of carbohydrate to every 100 grams of bread, this bread contains only 15 grams of carbohydrate per 100 grams, and in addition it has a greater fat and protein content than regular bread.

Atropine in the Treatment of Diabetes. Atropine sulphate and the methyl bromide of atropine have been used by Rudisch⁴ in a series of diabetics with signal success. He believes that atropine has a twofold action—it reduces the amount of sugar excreted, and also increases the carbohydrate tolerance. He thinks the first action was demonstrated by the fact that, in every instance, the sugar disappeared more rapidly from the urine when atropine was given with a carbohydrate-free diet than was the case when similar dietetic measures were employed alone. Two facts, he considers, point to the favorable influence of atropine in the carbohydrate tolerance. One is that patients tolerated much larger quantities of carbohydrates when atropine was given, and the second is that after atropine was administered for a considerable time the carbohydrate tolerance decidedly increased. He also found that if sugar had disappeared from the urine as the result of atropine, withdrawal

¹ Zeit. f. exper. Path. u. Therap., Band vi, Heft 1.

² Zeitsch. f. Balneologie, 1909, p. 164.

³ Spitalul, 1909, No. 3.

⁴ Medical Record, June 26, 1909.

of the drug caused a return of the glycosuria, even when the diet remained unchanged. A resumption of the drug invariably caused a cessation of the glycosuria.

The methyl-bromide of atropine, he found, acted slower than did the sulphate, although it was less toxic. He noted no serious toxic effect from the prolonged use of these drugs. The atropine was discontinued temporarily whenever the patients complained of dryness of the throat. He recommends the use of atropine methyl-bromide in doses of $\frac{2}{15}$ of a grain, three times a day, in adults, slowly increased by $\frac{1}{15}$ of a grain until $\frac{8}{15}$ are given three times daily. Atropine sulphate was begun in $\frac{1}{150}$ grain doses, three times a day, and increased until $\frac{1}{20}$ of a grain was taken at a dose.

Pancreatic Secretion in the Treatment of Diabetes. As a result of physiological and pathological studies, W. M. Crofton¹ came to the conclusion that severe diabetes was most probably due to failure in the pancreatic functions, possibly of an internal secretion. In accordance with this belief, he treated a case of marked diabetes in a girl, aged thirteen years, by means of 4 to 8 capsules of pancreatic extract a day, and one-grain tablets of secretin after meals without modifying her diet, and obtained apparently a remarkably good result. The pancreatic extract was withdrawn when the secretin was administered, the two forms of treatment being used alternately. When first seen, the child was passing fifteen pints of urine in twenty-four hours; the urine had a specific gravity of 1027, and contained 10.5 per cent. of sugar. Under the above treatment, in eight months the patient gained weight, her subjective symptoms improved, her urine fell to two and one-half to three pints in twenty-four hours, and contained only 5 per cent. of sugar. Crofton noted that, although there was a decided fall in the amount of urine passed when pancreatic extract was given, the percentage of sugar remained the same, but, when the secretin was administered, the glycosuria promptly diminished.

The Effect of Treatment on the Prognosis of Diabetes. Von Noorden² gives some encouraging facts about the prognosis of diabetes when properly managed, based upon his enormous experience of about 3000 cases of diabetes in the last fourteen years. By careful regulation of the diet in accordance with the metabolic findings, he has succeeded in keeping several hundreds of patients in good health and practically free from glycosuria for now over seven years. He is forced to regard the prognosis as invariably fatal in those cases of diabetes which occur in people under thirty years of age and in whom the marked glycosuria and acetonuria persists in spite of all dietetic regulations. When, however, even severe glycosuria occurs in older people, he has found the prognosis relatively favorable. As proof of this, he states that he has several hundreds of elderly people under observation in whom marked glycosuria has been com-

¹ Lancet, February 27, 1909.

² Medizinische Klinik, August 29, 1909.

pletely controlled by careful hygienic and dietetic management, and who, as a result, have enjoyed reasonably good health for five years. In conclusion, he emphasizes that the future of a diabetic depends entirely upon early and intelligent dietetic treatment. He regards so-called transitory glycosuria, if left untreated, as a forerunner of true diabetes. Therefore, he believes that the prognosis of diabetes in general will not become more favorable until every case of glycosuria is accorded the care and attention which it merits.

GOUT.

Etiology of Gout. With the increased interest in physiological chemistry, the subject of gout has been occupying more and more of our attention, and considerable time has been spent in attempts to trace out and explain the errors in metabolism upon which the etiology of the disease has been supposed for a long time to be based.

The present conception of gout is so well summed up in a brief editorial in the *Journal of the American Medical Association*, April 3, 1909, that a part of it will be quoted. Garrod was probably the first to demonstrate, in 1840, that the blood of the gouty contained an abnormally high quantity of uric acid. This was later verified by Magnus-Levy, who found from 3 to 6 mg. of uric acid per 100 c.c. of blood in gout, while normal blood contains, at most, doubtful traces of uric acid, except in a few special conditions. Within recent years, we have learned that the several stages in the production of uric acid from its original source, the nucleoprotein, are accomplished only through the successive actions of several distinct intracellular enzymes. Schittenhelm and Brugsch have shown that the blood from patients suffering from typical gout always contains a demonstrable quantity of uric acid, even when the food has been free from purins for weeks and months, while blood from normal individuals on purin-free diet contains no uric acid whatever. There is, therefore, in gout a deep-seated disturbance of metabolism, so that even the endogenous purins derived from the nucleoproteins of the tissues themselves cannot be destroyed or removed from the blood in the normal way. This accumulation of uric acid in the blood may depend upon either defective uric acid lysis in the individual's tissues, or upon failure of elimination by the kidneys. It is found, however, that in chronic interstitial nephritis uric acid is also demonstrable in the blood, but the amount varies with the functional activity of the kidneys, while in gout the endogenous uric acid maintains a constant level and never exceeds a certain maximum amount (about 0.003 per cent.).

West¹ goes a little more into detail in explaining this excess of uric acid in the blood. He believes it is due to—

¹ Practitioner, July, 1909.

1. Excessive ingestion of purins in the food.
2. Diminished destruction of others in the liver.
3. Diminished excretion of uric acid by the kidney, and this may be the consequence of—

(a) Defective action of the kidney owing to organic or functional disease.

(b) The absence of some intermediate organic nitrogen compound in the blood from which uric acid is, under ordinary circumstances, formed.

Brusch and Schittenhelm would limit the term "gouty diathesis" to the condition of uricacidemia persisting with a purin-free diet; in this form, the cartilage of the joints become involved only after the condition has persisted for a long time. In the uric acid retention, however, which results from nephritis, the periods during which uric acid is in the blood are too brief to lead to precipitation in the cartilages. In some of these cases where protracted retention occurs, the anatomical results are the same as when the retention is due to metabolic disturbance. Moreover, renal gout is clinically characterized by a predominance of renal and cardiovascular symptoms, although it is possible to have cases in which the two forms co-exist, or in which a simple metabolic gout becomes complicated by interstitial nephritis.

From what has been said above, it will be clearly seen that the exact relation of gout to nephritis is still more or less confused. West¹ has discussed this problem in some detail, considering especially the granular kidney as being the type most frequently found in association with gout. He reviews the various theories proposed to explain the production of granular kidney in gout, and then concludes that, while gout may produce chronic changes in the kidney, it does not cause granular kidney. Granular kidney, however, greatly increases the liability of the patient to gout, and usually of a severe type.

Hall² looks upon gout as due to some inborn defect or alteration of nuclein metabolism, which lowers the resistance of the tissues in certain directions and so makes the individual more susceptible to irritants, which are scarcely appreciated by those whose metabolism does not show this peculiarity. A slight injury, or indiscretion of diet, an overloaded intestine, or an increased toxicity of the intestinal contents will disturb the general nuclein metabolism and cause a local reaction in certain tissues.

His³ suggests that disturbance in the purin metabolism is not the true essence of gout, but is merely one symptom of a more general disturbance. This is based upon the frequency of groups of symptoms in gout which have no connection with uric acid, such as dyspepsia, skin diseases, myalgia and neuralgia, arteriosclerosis, and granular atrophy of the

¹ Loc. cit.

² Practitioner, July, 1909.

³ Deutsch. med. Woch., April 15, 1909.

kidney. He also emphasizes the importance of differentiating between gout and chronic arthritis, the one being due to a disturbance of purin metabolism, while the other is due to a local or some general cause not related to the purin metabolism. The *x*-rays may be of assistance in this differentiation, as gouty tophi cast no shadow; the final test, however, is the elimination of purin from the diet, or the finding of uric acid in the blood after four or five days of purin-free food.

Umber¹ reports some interesting metabolism findings. He studied 137 gouty patients, 27 of which were of the laboring class. He also made a comparative study of a number of healthy subjects. The greater part of the work was done on a purin-free diet. He finds that the elimination of uric acid on a purin-free diet grows less and less until an attack of gout is impending, when the elimination rapidly increases to reach a high point about the second day after the onset of the attack and then rapidly subsides. This retention of uric acid he ascribes to a peculiar affinity of the tissues for the uric acid. This curve he shows to be absolutely pathognomonic by a comparison with curves in various other affections. These individuals also respond to the ingestion of purin bodies with a much less and more protracted elimination of uric acid than do those without gout, this is especially marked during the stage following about a week after an attack. The ingestion of food containing much purin may of itself bring on an attack of gout. Another important feature of gout is the opposite behavior of uric acid and glycocoll, the retention of one coinciding with increased elimination of the other. During the marked increased elimination of uric acid during the attack, the glycocoll vanishes completely.

Wirgman² calls attention to the frequent association of pyorrhea alveolaris and gout. He states that he has never failed to find pyorrhea in an adult with either gout or rheumatism.

The Joint Changes in Gout. Watson³ states that it is now generally accepted that the articular changes in gout are due to the *deposit of the biurate of sodium* from the blood, in the form of acicular crystals. This salt acts as a chemical poison to the tissues, and produces inflammatory and necrotic changes. Whether this tissue necrosis is a necessary prelude or a result of the deposit of urates is still an open question. It seems probable, however, that the urates which are dissolved in the synovial fluid penetrate the cartilage and other tissues by lymph diffusion and are then precipitated, and that the change in the cartilage is reactionary. The precipitation occurs only when the synovial fluid is oversaturated. There is also some clinical evidence that re-resolution may sometimes occur. The cartilage is more involved than the fibrous tissues, due to the sluggishness of the lymph circulation here and to the feeble nutrition of the cartilage.

¹ Therapie der Gegenwart, February, 1909.

² Clinical Journal, May 26, 1909.

³ Practitioner, July, 1909.

In an acute attack of gout, the synovial membrane becomes injected and spongy, the fluid is usually thick, scanty, and turbid, and contains polymorphonuclear leukocytes, and, occasionally, crystals of biurate of sodium. The cartilage is inflamed, the cells multiply, and their matrix fibrillates. A white deposit of acicular crystals of sodium biurate occurs in its substance close to the free edge, giving a "whitewashed" appearance to the cartilage. This rarely extends through the cartilage to the bone, but, in advanced cases, the cartilage is gradually eroded, the articular ends of the bone exposed, and these, in turn, become the seat of inflammatory changes and deposit.

In these advanced cases a chronic arthritis of the chronic rheumatoid type results, the changes due to gout giving way to changes common to many forms of osteoarthritis. The periarticular structures may all become involved in a similar deposit. Later, the skin becomes stretched over the subcutaneous tophi, ulcerates, and a discharge of chalky material follows.

Recently, by means of the *x*-rays, other changes have been noted within the bones which resemble closely those seen in some forms of rheumatoid arthritis. Localized transparent areas may be noted in the distal extremities of the phalanges, having the appearance of small punched-out holes. Though situated near the diseased joints, they show no communication with the joint cavities. They are filled with a gelatinous looking substance with a deposit of urate adhering to the sides of the cavity. In addition to these, small nodes or bony deposits are sometimes seen at the sides of the phalanges. These gouty exostoses are true bone, and not urate. New bone may also be deposited, in chronic gout, around the margins of the articular surfaces, either irregularly or in the form of spurs, and also around sesamoid bones.

Cardiovascular Lesions in Gout. Kidd¹ calls attention to two types of lesions of the cardiovascular system in gout; the one, largely functional, and the other, the result of the renal changes. Of the first, the most frequent cardiac symptoms are irregular action, palpitation, tachycardia, bradycardia, syncope, angina pectoris, or anginoid attacks; these may alternate with frank gouty paroxysms, or may succeed to digestive disturbances, the result of indiscretions in diet. The individuals in which these symptoms occur are usually about forty years of age, inclined to stoutness and take little exercise. The pulse is generally of moderate or low tension, the arteries are not thickened, and the heart seems large and flabby without any evidence of valvular disease. Such cases seldom develop the cardioarterial lesions of granular kidney.

The second type of cardiovascular lesions seen in gout are those ordinarily found associated with interstitial nephritis, to which may be added lesions of the aorta and aortic valves, and sclerosis of the coronary

¹ Practitioner, July, 1909.

arteries. Following the arterial changes, capillary hemorrhages may occur in the bladder, the conjunctiva, and nose. Dead fingers, and flushing, as well as phlebitis or thrombosis, are also seen.

Changes in the Nervous System in Gout. Taylor¹ states that manifestations of nervous disorder may result directly or indirectly from the gouty state. Thus, paralysis or weakening of the muscles of one side of the body may be caused by cerebral hemorrhage, the outgrowth of high blood pressure and thickened arteries, caused, in turn, by the granular or gouty kidney. The thickening of the arteries may also be associated with a weak and dilated heart, favoring the occurrence of thrombosis, often affecting the cerebral vessels and giving rise to paralysis of varying degree and distribution.

Glycosuria and *peripheral neuritis*, associated with absence of knee jerk, paresthesia, and weakness of the lower limbs, may occur in the gouty, although a similar train of symptoms may be traced to the use of alcohol in these patients. *Sciatica* and *brachial neuritis*, without recognizable arthritic change, are sometimes noted. There may be a neuroretinitis quite apart from the form due to albuminuria and cardiovascular changes in other regions. *Neuralgia affecting the fifth nerve*, usually of severe type, and *migraine* may be related to gout.

There may be *mental depression* and *irritability*, while symptoms of *excitement* or *mania* may come on before, during, or after an attack of gout; *epilepsy* may also result from the attack. There may also be seen, in certain patients between fifty and sixty years of age, a condition of *premature senility*, with evidence of local brain changes. This consists of speech and articulatory difficulty without any sign of paralysis of the limbs, loss of memory, or power of concentration, and a great tendency to emotional instability, all due to vascular degeneration and imperfect blood supply to the brain.

Changes in the Skin in Gout. According to Galloway,² the cutaneous manifestations of gout fall into two main groups—those occurring in the early periods, in which the errors of metabolism are most in evidence, and those which occur in association with the period of arteriosclerotic change.

Pruriginous scaliness of the skin occurs in the earlier stages, especially on the extensor surfaces of the arms and legs, and the back of the neck. The itching provokes rubbing and scratching, followed by a dermatitis, which rapidly assumes the appearance of eczema. The first stage of the process is probably due to defective blood supply of the skin and epidermis. The upper layers of the epithelium are, as a result, badly formed and desquamate, a condition usually associated with pruritus. This starts the scratching, which is followed by the engrafting of various microorganisms, producing the true eczema of the gouty.

¹ Practitioner, July, 1909.

² Ibid.

In the later stages, there occur skin lesions more or less closely related to the cardiovascular and renal changes. They may be classed roughly under three heads:

1. *Eruptions of erythematous type*, usually slight and evanescent.

2. *Lesions characterized by exfoliation of the epidermis*. These are seen after the vascular and renal lesions are more pronounced. They consist of slight pityriasis, or a general exfoliative dermatitis; the association of the latter with renal changes giving rise to a most serious condition.

3. *Eruptions of a Purpuric Character*. These are the result of the vascular changes and the blood degenerations. They consist of sparsely scattered points of purpura, the more severe types of purpuric erythema, or eruptions of exudative and hemorrhagic erythema, depending upon the severity of the changes in the tissues and blood.

Changes in the Throat in Gout. McCracken¹ describes the gouty throat as one of the irregular symptoms of this affection. In a considerable number of cases suffering from various forms of throat trouble he has been able to detect (1) the presence of uric acid in the urine in marked amount, and (2) the disappearance of the increased uric acid contemporaneously with the cure of the throat trouble. He believes that heredity and high living may be predisposing causes, but that the attack itself is of purely toxic origin. He refers to the frequent association of pyorrhea alveolaris and gout.

The type of lesion in the throat varies considerably, but is usually of the acute explosive type, rather than of a chronic nature. The tonsils, pharynx, or larynx may be affected. The diagnosis depends not so much upon the local signs as upon a careful consideration of the patient's habits of life, his general systemic condition, and the urinary examination.

Treatment of Gout. There has not been much published which is distinctly new upon this phase of the subject. Goodhart² expresses the modern idea when he emphasizes the importance of treating each patient as a separate case. In general, however, he takes exception to the rigid dietary usually prescribed. He eliminates the rich sauces, gravies, spices, etc., as they tend to disturb the digestion. Too great amounts of starches or sugars should likewise be avoided, as they increase the output of uric acid. He especially emphasizes the eliminative action of the salines.

Duckworth³ regards the reduction in the total amount of food as the most important of the various dietary measures.

Falkenstein⁴ states that the various ideas of diet can be easily explained when we consider that different organs furnish the maximum amount of disturbance. When the liver is at fault, the fats should be eliminated;

¹ Practitioner, July, 1909.

² Ibid.

³ Ibid.

⁴ Berl. klin. Woch., August 9, 1909.

in disease of the pancreas, the carbohydrates; if the stomach is disturbed, the nucleo-proteids. The attempt to increase the ferments of disturbed organs by the ingestion of their extracts is still in the experimental stage. If the use of hydrochloric acid in gout aids in the breaking up and destruction of albuminous substances, and so lessens the amount of uric acid, it is to be advised.

Luff¹ holds largely to the bacterial origin of gout, and therefore emphasizes a thorough removal of the intestinal contents by means of calomel and saline as an initial measure in treatment. The free administration of water, associated with colchicum, or its active principle colchicin, and potassium citrate, make up the plan of attack generally employed. In regard to climate, a bracing air with a low relative humidity is most suitable. Electric light and superheated-air baths may be beneficial by promoting the oxidative processes within the body, and by stimulating the circulation of both the blood and the lymph in the affected joints, thus leading to improved nutrition.

Umber² suggests the abstinence from meat entirely when an attack is threatening, and for a week or two afterward. The interpolation of 1 to 3 or more purin fast days in each week will also be followed by beneficial results. Inasmuch, also, as the retention of uric acid is more marked at night, as he was able to prove by his metabolic work, he advises that the principal meal be taken in the morning, or, at the latest, at noonday. Copious ingestion of water aids the elimination of urates, while alkaline waters have the opposite effect—a strong argument against the waters with a strong “lithium content.”

Baths, according to Bannatyne,³ act partly by causing increased perspiration and the expiration of watery fluid from the lungs, with consequent increased imbibition of fluid and flushing of the body channels, also by their sedative action on the nervous system, and partly by their effect as a stimulant to the whole circulation. This is all followed by an increased excretion of toxic substances. They are best given at the various spas. These are discussed by Rendall,⁴ especially as they are found in Europe.

¹ Berl. klin. Woch., August 9, 1909.

³ Ibid.

² Loc. cit

⁴ Ibid.

OPHTHALMOLOGY

BY EDWARD JACKSON, M.D.

International Standard of Visual Acuity. The most notable event of the International Ophthalmological Congress, held last year at Naples, was the adoption of an International Standard for acuteness of vision. The standard was recommended by a committee appointed five years previously, by the Congress at Lucerne. According to this standard, normal visual acuteness is ability to distinguish, as separate, two points separated by an angle of one minute. The standard test figure is the incomplete or broken ring, shown in Fig. 35. This ring, when 7.25 mm. in diameter and placed at a distance of 5 meters, subtends an angle of five minutes. The width of the black line is one-fifth the diameter of the ring, and the break in the line is just as wide as the line, subtending an angle of one minute. The patient is tested



FIG. 35

by requiring him to indicate the direction in which the break in the ring is turned. The break can be turned up, down, right, or left, or at an angle of 45 degrees between. A single ring printed on a circular card can be used to test the acuteness of vision. As it can be turned in either of eight directions, a few repetitions of the test will exclude any possibility of correctly guessing its position. It is a test that is equally applicable to persons of all nationalities, and of any degree of mental development—to the illiterate as well as to those who can read. It is not intended that letters, numerals, and simple geometric figures for testing the sight should be given up. But when used, these should be numbered in accordance with this standard. The International Committee proposed a test-card upon which, with the broken rings, are used certain letters and numerals. The largest are intended to be visible at 50 meters, indicating, when used at 5 meters, vision equal to $\frac{1}{10}$. The intervals between the different lines are such that the reading of each line at the standard distance indicates a multiple of $\frac{1}{10}$ of visual acuity. Other suggestions that vision should be recorded in decimal fractions, or multiples of one, have been made by v. Csapodi,¹ who would call $\frac{1}{10}$ of normal vision a katoptry, and by Dehenne.²

¹ Transactions XVI International Congress of Medicine, Budapest.

² La Clinique Ophtalmologique, November, 1909.

Protective Spectacles. The increasing use of protective spectacles to guard the eyes against wind, dust, light, etc., makes the question of the proper *form* important. The *curved* or *coquille lenses* afford more complete protection to the eye, and cause less apparent displacement of objects seen through them near the edge. By mathematical demonstration, Green¹ shows that, when the two surfaces are concentric, coquilles necessarily act as concave lenses. On the other hand, if both surfaces have the same curvature, the glass acts as a convex lens, is thicker at the edge, and causes more displacement of objects seen through that part of it. The best form for coquilles, giving them a zero lens action, is that in which the concave surface is made slightly flatter than the convex; the difference in the length of the radii of curvature being one-third the thickness of the glass at the centre.

The best *color* for protective glasses is still unsettled. Fox² finds that some cases of asthenopia are greatly relieved by wearing lenses made of glass that has acquired an amethyst tint by long exposure to sunlight. Schanz and Stockhausen³ and Hallauer⁴ have experimented with the idea that eyes suffered more from ultraviolet rays than from exposure to ordinary light. With this idea in mind, they have recommended varieties of glass that exclude these rays, with some of the shorter light-waves of the visible spectrum. Such glass has a grayish, or greenish-yellow tint. Amber-yellow glass also has this power of excluding short wave radiations; and lenses made of it have proved satisfactory in the strong light of the tropics, and upon the snow fields of high mountains. However, Birch Hirschfeld⁵ finds that the ultraviolet rays cannot reach the normal retina because they are absorbed by the cornea, and especially by the crystalline lens; and, indeed, they pass very poorly through any kind of glass. He thinks there is no proof that they cause disease of the eye. It seems probable that to prevent dazzling from dilatation of the pupil, and to lessen the annoyance caused by diffused light from opacities in the cornea and crystalline lens, the ordinary London smoke glass is at least as serviceable as any other.

Anesthetics. While the substitutes for cocaine have multiplied, none of them has been able to replace it in general use. The committee of the British Medical Association,⁶ appointed to investigate the toxicity of different local anesthetics, concluded that, taking cocaine as a standard, the relative toxicity of these drugs was as follows: Alypin, 1.25; cocaine, 1; nirvanin, 0.75; stovain, 0.62; tropocain, 0.50; novocain,

¹ American Journal of Ophthalmology, November, 1909.

² Transactions Section on Ophthalmology American Medical Association, 1909.

³ Klinische Monatsblätter f. Augenheilkunde, October, 1909.

⁴ Archiv f. Augenheilkunde, lxiv, p. 259.

⁵ Klinische Monatsblätter f. Augenheilkunde, July, 1909.

⁶ British Medical Journal, March 27, 1909.

0.49; beta-eucaine lactate, 0.41. *Novocain* they found much less irritant than the others which approached it in safety. *Alypin*, besides being more toxic, is a less efficient anesthetic for ophthalmic practice. Elliot¹ found it very unsatisfactory for cataract extraction and liable to be followed by excessive hemorrhage. For ophthalmic operations *sco-polamin-morphine narcosis* offers few advantages. Stuelp,² in 100 operations, secured complete anesthesia in only 45, and partial anesthesia in 26; while in 29 the injections failed to produce sleep, and sometimes increased the excitement.

DISEASES OF THE CONJUNCTIVA.

Ophthalmia Neonatorum. Studying the bacterial flora of the normal conjunctival sacs of two hundred newborn children, Rosenhauch³ found them absolutely sterile immediately after birth. Organisms were first found twenty-four hours later, and subsequently became constant, as in the adult conjunctival sac. He thinks gonorrheal infection is very improbable during birth, and that it usually occurs subsequently. This view supports Weiner's contention,⁴ that silver nitrate solution should not be instilled as a prophylactic; but that special care should be taken to keep the eyes and fists of the infant clean. It may be remembered that cleansing of the eyes has always been the first step in the Credé method.

The prophylactic value of the newer silver salts for ophthalmia neonatorum must still be regarded as unsettled. While many ophthalmologists reject them as unreliable, a few statistical studies seem to support the claims made for them. Thus, Stadfeldt⁵ found that in the treatment of ophthalmia neonatorum better results were attained with the organic silver salts than with the silver nitrate. Von Herff⁶ reports, from an experience of over four years with the use of 5 per cent. solution of *sophol*, that no case of early gonococcal infection occurred among 6000 children subjected to this prophylactic treatment, instead of to the Credé method. Such a solution has the advantage of being non-irritant, and of causing no tendency to conjunctival hemorrhage.

The recent report of the committee of the British Medical Association⁷ shows that among those acquainted with the facts there is a

¹ Ophthalmoscope, October, 1909.

² Klinische Monatsblätter f. Augenheilkunde, July, 1909.

³ Bericht der Akademie der Wissenschaften in Krakau, 1909.

⁴ St. Louis Medical Review, May, 1909.

⁵ Klinische Monatsblätter f. Augenheilkunde, May, 1909.

⁶ Münchener med. Wochenschrift, Nos. 46 and 47.

⁷ British Medical Journal, May 8, 1909.

unanimous feeling that *ophthalmia neonatorum* should be placed in the list of contagious diseases, of which the health authorities should be promptly notified. This is demanded for the prevention of blindness in the infant; and also that attendants may be warned of the danger of infection, since not a few eyes are lost by those who nurse such cases. This committee found that more than one-third of those in the British Blind Schools have become blind through this disease. They urge the more definite and emphatic teaching of midwives with regard to its dangers. Morrow¹ points out that, however valuable the Credé or similar methods may be, the extermination of blindness from *ophthalmia neonatorum* will not be effected without educating the public as to the source of the disease, and the modes of communicating it. An instillation of a silver salt after birth may prevent primary infection; but it will not prevent later infection, which, as pointed out above, is probably the greater danger. The wonderful statistics supporting the Credé method are from the practice of institutions and obstetricians fully alive to the dangers of the disease, where late infection also would be carefully guarded against.

Metastatic Gonorrheal Conjunctivitis. Among 2300 cases of gonorrhea, Heerfordt² saw 22 cases of metastatic gonorrheal conjunctivitis and 7 of iritis. He calls attention to the large phlyctenules which occur, and in one-half his cases vesicles formed on the cornea. He suggests the name *epibulbar subconjunctivitis* for this condition. In Zentmayer's case³ there was a bilateral intense congestion of the conjunctiva with scanty discharge. No gonococci were found in the secretion. The attack developed with a specific urethritis, and after it subsided a severe synovitis followed. McKee,⁴ in a typical case of metastatic conjunctivitis, was able to obtain a pure culture of gonococci from the conjunctival secretion. He also found engorgement of the lymphatics and bloodvessels with polymorphonuclear leukocytes, which may indicate that the gonococci found their way to the conjunctiva in emboli.

Ocular Infection by Flies. *Ophthalmia neonatorum* is much less frequent in Egypt than gonorrheal *ophthalmia* among older children. Meyerhof,⁵ in his account of the influence of climate upon *ophthalmias* in Egypt, states that he saw but two cases of purulent conjunctivitis in the newborn, while he encountered 249 cases in children from one to fourteen years of age, and 69 cases in adults. His statistics for three years show that very few cases occur from December to May, the minimum being in February. But during the summer the number

¹ New York Medical Journal, vol. lxxxix, p. 988.

² Graefe's Archiv f. Ophthalmologie, lxxii, Heft 2.

³ Ophthalmic Record, December, 1909, p. 572.

⁴ Ophthalmoscope, July, 1909.

⁵ Annales d'Oculistique, April, 1909.

of such infections runs up rapidly, reaching a maximum in October, when they are twenty times more numerous than at the minimum. Something of the same kind is noted with reference to *acute contagious conjunctivitis*, caused by the Koch-Weeks bacillus. Very few cases of this disease occur in the first three months of the year. Then the number increases rapidly, until the maximum is reached in June, when about thirty times as many cases are seen as at the minimum. After this the frequency falls off until August, then rises in October almost to the height of the maximum, after which it gradually declines to the close of the year.

Meyerhof compares the curves of frequency of these two infections with the curves of temperature and relative humidity, and finds that they do not correspond. The ophthalmia curves more nearly approach the curve representing the flow of water in the Nile, the overflow of which reaches the maximum late in September. But the frequency of infection does correspond closely to the prevalence of flies; and while the actual carrying of the bacteria upon the feet of flies has not been demonstrated in connection with these diseases, yet cases occur in which no other avenue of contagion can be traced. It is to be noted also that the recent infections with trachoma are about four times as numerous from May to September as at the minimum in February. Conjunctivitis due to the diplobacillus of Morax and Axenfeld, however, is about equally frequent throughout the year.

DISEASES OF THE CORNEA.

Suppurating Ulcer. There is no rigid and absolute connection between the clinical type of a corneal ulcer and the form of bacteria causing it. Both microscopic findings and careful clinical study must be available for the best management of severe cases of corneal ulceration. The connection of true *serpent ulcer* with the pneumococcus has been previously referred to.¹ As this germ does not cause serpent ulcers in the lower animals, Fuchs² has studied the subject by inoculating with the pneumococcus the cornea of an eye that was soon to be enucleated. At the point of inoculation a small white spot of infiltration appeared on the second day. The eye being enucleated the next day, a small pocket of pneumococci and necrotic tissue was found under Bowman's membrane. It is extension of such an area that constitutes the progressive border of serpent ulcer when it creeps across the cornea. Fuchs concludes from a study of clinical cases that typical serpent ulcer develops when an erosion of the cornea has become infected with the pneumococcus.

¹ PROGRESSIVE MEDICINE, June, 1908. ² Wiener klinische Wochenschrift, No. 1.

From the bacteriologic studies that have been carried on for many years at Bonn, zur Nedden¹ finds that although the serpent ulcer is generally caused by the pneumococcus, there were a few cases in which this germ could not be found. In these, the ulcers seemed to be due to the diplobacillus of Morax and Axenfeld, the diplobacillus of Petit, the bacillus subtilis, and other rare species. Severe corneal ulceration due to the Morax-Axenfeld bacillus is reported by Weekers;² and Oreste³ records cases due to the bacillus of Petit. He believes that about one-fifth of the cases of serpent ulcer are due to this bacillus. Clinically these cases differ from those of pneumococcus ulcer in causing less severe pain and less plastic iritis. Rosenhauch⁴ has also recorded 10 cases of ulceration due to the Petit bacillus. The ulcers are large and occupy the centre of the cornea with deep infiltration. In half the cases there was a history of injury.

In the *treatment* of suppurating ulcers *specific serum therapy* by *antipneumococcic serum* has failed to effect a cure after the ulcer had fully developed. Römer,⁵ who worked out this serum, now admits that it is chiefly useful as a prophylactic. He points out that in these cases there is usually a history of several days elapsing between an injury of the cornea and the development of the ulcer. It is during this period that the treatment is effective. In this claim, he is sustained by the experience of others who have tried the serum.

The non-specific use of *antidiphtheritic serum* is reported to be quite effective for many acute inflammations of the eye, including corneal suppuration following accidental trauma or operation. Of Zimmermann's⁶ 28 cases, 18 were of suppurating corneal ulcers, in which excellent results were attained. He usually begins with an injection of 1500 units of the Behring serum. Commonly a single injection is all that is required. But 2 of his cases received 4000 units each; Angiollella⁷ has given 5000. Darier⁸ claims that equally good results are attained with the serum of Roux given by the mouth. The dose is 10 c.c. diluted to twelve times that bulk with physiologic salt solution.

Walker⁹ urges the value of *kerotomy*, an operation devised by his father, and used in the last twenty-four years in some 4000 cases of corneal disease. It consists in thrusting a broad needle through the scleral limbus, parallel to the plane of the iris, until visible in the anterior chamber. Punctures of this kind are made all around the cornea, in severe cases separated only by the width of the needle, in less severe

¹ Archives of Ophthalmology, January, 1909.

² Annales d'Oculistique, July, 1909.

³ Ibid., October, 1909.

⁴ Klinische Monatsblätter f. Augenheilkunde, September, 1909.

⁵ Deutsche med. Wochenschrift, p. 2148.

⁶ La Clinique Ophthalmologique, January, 1909.

⁷ Ibid., October, 1909.

⁸ Ibid., February, 1909.

⁹ Ophthalmoscope, November, 1909.

cases at wider intervals. The incision is to be made so oblique and valvular that upon withdrawal of the needle no aqueous escapes. It is claimed that this operation is safer than the corneal incision, usually called the Saemisch incision, but which Walker claims should be credited to Guthrie.

Parenchymatous Keratitis. Gifford¹ believes that if all children were examined for evidences of inherited syphilis, and placed upon appropriate treatment, the number of cases of parenchymatous keratitis and syphilitic deafness would be greatly diminished. He finds well-marked signs or histories of inherited syphilis in about 90 per cent. of his cases. The dental evidences include, besides the Hutchinson teeth, which wear down and lose their characteristics before the age of thirty, the deformity of the milk canines, also pointed out by Hutchinson, in which a central blunt peg projects from a base of normal looking tooth; and the deformed molar of Fournier, in which the tuberosities of the summit are discolored and surrounded by a groove, beyond which the tooth bulges out on all sides. Gifford has also observed what he calls the *sloped molar*, in which the base of the tooth at the gum is much wider than at the crown, but the cusps are fairly well formed, with little tendency to decay.

For the *treatment* of parenchymatous keratitis Gifford urges the vigorous use of antisyphilitic remedies, such as inunction daily, with almost 2 grains of mercurial ointment to the pound of body weight. This is continued for a week, if the gums are not touched, and repeated after a week's rest. Later the weeks of inunction are repeated at longer intervals, as one week in every two months of the second year, while the disease is active. Gifford also uses sodium salicylate in large doses, and finds also that better results are attained by the administration of arsenic at the same time. Stephenson² also recommends arsenic in the form of Donovan's solution, or atoxyl. Of the latter he gives one-fourth to one-half gram two or three times a week, never exceeding a total of 6 grams. Williams³ reports a case ascribed to auto-intoxication. Recovery occurred under the use of intestinal antiseptics and a diet of green vegetables.

Phlyctenular Keratitis. The connection of this disease with tuberculosis seems indicated by recent investigations. Tested by the skin reaction of v. Pirquet, Weekers⁴ found, of 58 children, 51 gave positive evidence of tuberculosis. Derby and Ayer⁵ state that the cutaneous test was positive in 92 per cent. of their cases. Among adults, Cohen⁶

¹ Transactions Section on Ophthalmology, American Medical Association, 1909.

² Ophthalmoscope, February, 1909.

³ Journal of Ophthalmology and Otolaryngology, August, 1909.

⁴ Archives d'Ophthalmologie, May, 1909.

⁵ Transactions Section on Ophthalmology, American Medical Association, 1909.

⁶ Klinische Monatsblätter f. Augenheilkunde, April, 1909.

found that phlyctenular keratitis or conjunctivitis was often a forerunner of general tuberculosis.

Gradle¹ has treated phlyctenular disease with antistaphylococcic serum, curing cases that remained uninfluenced by the usual treatment. He does not, however, regard the staphylococcus as the original cause of the phlyctenule, believing that it simply prolongs the attack.

Corneal Opacities. That different conditions have been reported under the titles of nodular or grill-like keratitis has been suggested before.² Zentmayer,³ who reports a case, accepts this view, and the division of cases into the following classes: (1) Distinct nodules in the anterior layers of the cornea, with dust-like opacities clouding the tissue between. (2) Nodules as above, but with clear corneal tissue intervening. (3) Grill forms presenting a fine network of elevated lines. (4) A ring-form, probably accidental. Zentmayer's case belonged to the first group, and showed degenerative changes in the epithelium and in the substance of the cornea. Paderstein⁴ made microscopic examinations of eyeballs affected thus, and found a hyaline deposit beneath the epithelium adherent to Bowman's membrane. Wehrli⁵ reports the case of a younger brother of a patient he had previously reported, and again urges the connection of the condition with tuberculosis. Evidence of a tuberculous character was found in all three of his cases.

Folker⁶ places on record eight cases of *family degeneration of the cornea*, occurring in three generations. All were bilateral. But the ages at which interference with vision was noted varied from early childhood, "vision always defective," to fifty years of age. Komoto⁷ records the case of a doctor, his son, daughter, and nephew, all born with bilateral corneal opacities, the son and daughter having also congenital cataract in one eye. The condition is believed to be one of arrest of development rather than a sequel of inflammation.

Oval Cornea of Inherited Syphilis. The normal cornea seen from behind is round, but appears oval with a long axis horizontal from in front, because of overlapping above and below by the opaque limbus. Fuchs⁸ was struck with the shape of the cornea in some cases of parenchymatous keratitis, an ellipse with the long axis vertical. This shape is real, and does not depend upon overlapping by opaque tissue at the sides. Fuchs has studied the connection of this shape with inherited syphilis. He collected in one year 28 cases, in which one or both

¹ Ophthalmic Record, June, 1909.

² PROGRESSIVE MEDICINE, June, 1906.

³ Ophthalmology, July, 1909.

⁴ Klinische Monatsblätter f. Augenheilkunde, February and November, 1909.

⁵ Ibid., September, 1909.

⁶ Transactions Ophthalmic Society of United Kingdom, vol. xxix.

⁷ Klinische Monatsblätter f. Augenheilkunde, October, 1909.

⁸ Ophthalmic Review, September, 1909.

corneas were strikingly of this shape. Excluding six old people, in whom evidences of inherited syphilis are difficult to obtain, he found that of the 22 remaining cases, 8 showed good evidence of syphilitic heredity, and 8 others gave some indication of it. Since, in the time covered, he saw about 50 cases of parenchymatous keratitis, such deformity of the cornea is not the rule among them. But the proportion must be very much larger among persons who inherit syphilis than among those who do not. With coloboma of the iris, the cornea is apt to be ovoid, the long axis vertical, with the narrow or pointed end downward. But in the condition Fuchs describes, the form of the cornea is a true ellipse. In all but three of these cases he found corneal astigmia of 3 or 5 D. against the rule, that is, longer radius for the vertical meridian.

THE UVEAL TRACT.

Anisocoria. Inequality of the pupils is believed by Boyd¹ to be more common at high altitudes. Thus, of 5000 presumably healthy persons examined at Leadville, Colorado (10,000 feet above sea level), 50 per cent. showed inequality of the pupils. This was not dependent upon inequalities of refraction in the two eyes. It appeared to be a unilateral mydriasis, which occurred as frequently in one eye as in the other, and might be due to hyperactivity of the sympathetic. The inequality mostly disappeared with convergence.

Etiology of Iritis. Jennings and Hill² present statistics of 500 cases of iritis seen in Philadelphia. The number of cases accredited to different causes were: Syphilis, 307; rheumatism, 127; gonorrhea, 26; influenza, 7; exposure, 7; tuberculosis, 6; malaria, 6. The 14 remaining cases were traced to ten different causes. Of the cases of syphilitic iritis, it was noted that 234 were in males and 73 in females. Of 136 cases in which the time is noted, iritis occurred within one year of the initial lesion in 52 cases, and between one and five years in 64 cases. Of the 127 cases of rheumatic iritis, the relation of the attack to rheumatic attacks was noted in 80. In 22 the attacks were coincident, in 10 others they occurred within one year, while in 48 the period ranged from one to thirty-four years. Of the 26 cases of gonorrheal iritis, 10 suffered from arthritis. In only one case was the attack bilateral. In 5 of the 6 cases of tuberculosis, the cornea became involved apparently secondarily.

Uveal Tuberculosis. Fage³ contrasts the medical and surgical treatment of tuberculosis of the iris, as illustrated in 112 cases. Of the 39 cases treated medically, he counts 30 as cures; 3 of them retained a certain amount of vision, but 7 suffered atrophy of the eyeball. Of

¹ Colorado Medicine, June, 1909.

² Ophthalmology, October, 1909.

³ Archives d'Ophthalmologie, June, 1909.

73 treated surgically, 61 were enucleated; 10 were submitted to iridectomy, and, of these, 8 are counted cured, while 2 suffered atrophy of the globe. Fage points out, however, that operation may cause extension of the tuberculous process, and on that account should be avoided except where the growth has broken out of the eyeball.

The *prognosis* of uveal tuberculosis has been so completely changed by the adoption of the *tuberculin treatment*, that the older statistics have very little significance for the ophthalmologist now called upon to deal with this condition.

Among more recent experiences, Dor¹ reports 8 cases of tuberculous inflammation without extensive tuberculous deposits, which all improved or recovered under the use of tuberculin. Zur Nedden² points out that the treatment of uveal tuberculosis consists in increasing the healing factors in the blood, by injections of tuberculin T. R. and general hygienic means, and encouraging their local determination to the eye by moist heat, instillation of dionin and subconjunctival injections of salt solution, and paracentesis of the anterior chamber. In the discussion of Zur Nedden's paper, a dozen German ophthalmologists reported their experience with tuberculin treatment, which was almost uniformly favorable.

The connection of tuberculosis with *chronic choroiditis* is still uncertain. But Bernheimer³ reports five cases in which the choroiditis was cured by use of the tubercle bacillus emulsion. He states that the ophthalmic picture shows nothing characteristic of tubercle, and that infection elsewhere may not be recognizable.

Sympathetic Disease. So long as the essential pathology of sympathetic ophthalmia is unknown, and so long as the clinical picture of sympathetic disease cannot be sharply defined, there will remain a large number of cases, which, although departing widely from the usual characters of sympathetic ophthalmia, may still be regarded as closely allied to it, and likely to be benefited by removal of the probably unfavorable influence of the fellow blind and degenerated eye. Several such anomalous cases have been reported in the last year.

Axenfeld⁴ saw a case in which detachment of the retina, in the region of the macula, preceded by two weeks the uveitis of a sympathetic inflammation. In this case, although the exciting eye was promptly enucleated, the inflammation which set in two weeks later left the sympathizing eye greatly damaged. Three cases of sympathetic inflammation resulting from intra-ocular sarcoma are reported by Meller,⁵ who believes that such cases are best explained on the supposition of an endogenous infection.

¹ La Clinique Ophtalmologique, April and May, 1909.

² Klinische Monatsblätter f. Augenheilkunde, March, 1909.

³ Zeitschrift f. Augenheilkunde, October, 1909, p. 377.

⁴ Klinische Monatsbl. f. Augenheilk., Schmidt-Rimpler Festschrift, p. 113.

⁵ Graefe's Archiv f. Ophthalmologie, lxxii, Heft 1.

Quite as anomalous as any is a case reported by Axenfeld, in which both eyes recovered. A girl, aged four and one-half years, suffered a wound of the sclera and injury of the ciliary body, that caused a prolapse of the iris. There followed, twenty days later, sympathetic inflammation in the other eye. Under mercurial inunctions, warm stupes, and scopolamin, both eyes recovered with full vision within two months. Cases of recovery of the sympathizing eye, after enucleation of the exciting eye, are reported by Butler¹ and Fejer.²

GLAUCOMA.

To offset the tragic history of Javal, who died blind of glaucoma in spite of repeated operations performed by masters in ophthalmology, we have now the equally striking history of Laquer,³ who lived in the enjoyment of full vision almost thirty years after the cure of glaucoma in each eye by iridectomy. Laquer noticed the first attack of dimness of vision with increased tension at the age of thirty-five, both eyes being involved at that time. The case was a typical inflammatory glaucoma from the start. For six years it was combated by palliative measures, but the increasing severity and frequency of the attacks, of which there had been hundreds in the right eye, compelled a recourse to iridectomy, which effected a permanent cure. The exciting causes of the attacks were usually some form of emotional excitement, anger, shame, even the pleasurable excitement of music or a theatrical performance. Want of food and breathing bad air also caused a rise of tension.

Jackson⁴ has pointed out the possible production of glaucomatous attacks by emotion, through increase in the blood pressure, and how the recognized palliatives may act by reducing vascular tension. The intra-ocular tension always lies somewhere between the venous pressure as a minimum, and the arterial pressure as a maximum. Very high intra-ocular pressure is only possible when the arterial pressure is above the normal. The importance of lowering the blood pressure by local bleeding and venesection should be borne in mind by the practitioner who may be compelled to use palliative measures until a radical operation can be done.

Influence of Drugs on Intra-ocular Tension. The influence of drugs upon the intra-ocular tension has recently been a subject of careful study. Schiotz,⁵ experimenting with the tonometer devised by himself, found

¹ Ophthalmology, April, 1909.

² Centralblatt f. Augenheilkunde, August, 1909.

³ Klinische Monatsblätter f. Augenheilkunde, June, 1909.

⁴ American Journal of Ophthalmology, December, 1909.

⁵ Archiv f. Augenheilkunde, vol. lxii, p. 317.

that even in normal eyes a 0.5 per cent. solution of *eserin* or a 2 per cent. solution of *pilocarpine* reduced the tension of the eyeball quite regularly and to a notable extent. The same observation is reported by Langenhan.¹ *Morphine* and its derivatives, and *cocaine* produced little or no decrease of tension; in normal eyes the *mydriatics* were equally unable to cause increased intra-ocular pressure. The ability of mydriatics to produce an outbreak in an eye predisposed to glaucoma is again illustrated by a case reported by Breuil,² in which the glaucomatous attack followed the use of *euphthalmin*. The superiority of the brief mydriatic was illustrated in this case, the attack yielding promptly to an instillation of *eserin*.

The influence of *adrenalin* upon the intra-ocular pressure has been studied by Rupert³ in both normal and glaucomatous eyes. On normal eyes the effect is slight, falling within the limits of possible error in observation. In glaucomatous eyes it is much more marked, and lasts for some days. In a few eyes it reduced the intra-ocular tension; but in others it caused an increase in tension sufficient to produce an outbreak of glaucoma. When used with *eserin*, increase or decrease of tension followed, according to the drug which predominated. These observations emphasize the need of great caution in the use of *adrenalin* in eyes that are glaucomatous or predisposed to glaucoma.

Operations for Glaucoma. Of the newer operations for the relief of glaucoma, sympathectomy seems to be unused and almost forgotten. The benefits from a *cyclodialysis* frequently appear to be only temporary. At present, efforts are being directed toward the creation of a permeable or filtration scar. Attempts of Lagrange and others in this direction were referred to last year.⁴ They cannot be said to have won an established position in the treatment of glaucoma. Fergus⁵ has made a trephine opening at the lower outer margin of the cornea, adding a *cyclodialysis* by passing an iris spatula between the sclera and the root of the iris and ciliary body. But he urges that, while so far satisfactory, his experience with the operation is not yet sufficient to justify recommending it.

CRYSTALLINE LENS AND VITREOUS.

Causes of Cataract. The chemical composition of the crystalline lens, both normal and cataractous, has been studied by Burge,⁶ especially with reference to the composition of the ash. In the normal lens

¹ Centralblatt f. Augenheilkunde, November, 1909.

² La Clinique Ophthalmologique, March, 1909, p. 146.

³ Zeitschrift f. Augenheilkunde, February and March.

⁴ PROGRESSIVE MEDICINE, June, 1909.

⁵ Ophthalmoscope, February, 1910.

⁶ Archives of Ophthalmology, September, 1909.

no marked difference of composition was noticed between infancy and old age. But in the cataractous lens there was a very marked decrease in the percentage of potassium, and an equal increase in the percentage of sodium salts. There was also increase in the magnesium and calcium salts. In general, the ash of the cataractous lens much more closely resembles that of the blood, or lymph, than does the ash of the normal lens. Burge concludes that the chemical changes indicate that cataract is not an instance of excessive senile change, but shows a departure from normal metabolism.

This is not opposed to the observations summarized by Mawas¹ regarding the intra-ocular changes in cataract. These he finds include lesions of the ciliary body, the secretion of an abnormal aqueous humor, and changes in the capsule and epithelium of the crystalline lens itself. Scalinci² points out that, under normal conditions, the protein component of the lens must occur as an alkaline albumin. This is readily precipitated by such feeble acids as acetic, formic, and oxybutyric. Experiments show, that, even in very dilute solutions, these tend to render the lens hazy. Mere abstraction of water does not cause opacity of the lens, since the lens suspended in dry air over calcium chloride may retain perfect transparency when one-half its weight is lost—a loss of water far in excess of anything possible within the living eye. The investigations of Römer,³ and his attempts based thereon to treat early cataract by lens feeding, a kind of serum therapy, have been productive of numerous theoretic discussions, but no important new facts.

Extraction of Cataract in the Capsule. The interest awakened in this operation by the work of Major Smith may be judged by the fact that four ophthalmic surgeons have made the pilgrimage to India to learn the operation under Smith's personal instruction. Jamison,⁴ of Belfast, Ireland, who made a similar pilgrimage, reports his experience with 680 cases. His unfavorable complications were: Escape of vitreous in 35, capsule not extracted in 17, iritis in 11, suppuration in 4, expulsive hemorrhage in 2. The vision obtained, measured seven days after the operation, was often normal, and in 96 per cent. of the cases was estimated at $\frac{6}{9}$ or over. Lister⁵ studied the results in 98 cases that had been operated upon on an average of three and seven-tenths years before. There was no case of detachment of the retina. Eight eyes showed disease of the fundus, 1 syphilitic optic neuritis, 1 malarial optic neuritis, 1 disseminated choroiditis; 3, in which the lens had been previously depressed, showed the changes that commonly follow that

¹ Rev. Gén. d'ophtalmologie, November, 1909.

² Ophthalmoscope, December, 1909.

³ PROGRESSIVE MEDICINE, June, 1907.

⁴ Ophthalmic Record, February, 1910.

⁵ Archives of Ophthalmology, January, 1910.

operation; 1 patient presented bilateral optic atrophy, although only one eye had lost vitreous at the time of operation. Lister believes that although this series is comparatively small, it is sufficient to cast doubt upon the conclusions of ophthalmologists who reject Smith's operation for fear of the after effects of loss of vitreous. Clark,¹ from his experience of 121 extractions made at Jullundur, was convinced "that our fears of secondary ill-effects from this method of delivering the lens are not well founded." Vail,² from his observations at Jullundur, believes that this is the operation of the future among the best surgeons of the world. But all who have written on the subject insist upon the importance of a perfected technique, and highly skilled assistants.

Savage,³ struck with the amount of trauma necessary to free the lens in the Smith operation, has devised an instrument to be introduced within the eye to make pressure directly upon the lens for the purpose of detaching the cataract at its capsule. This has since been used by himself and colleagues with excellent success.

Vitreous Hemorrhage. Recurrent, *non-traumatic hemorrhage* into the vitreous in young men is a condition as to the causation of which very little is known. Kipp⁴ reports a case, occurring at the age of twenty-one and twenty-two years, in a young man suffering for many years from tuberculosis of the glands and of the hip-joint, and in whom the tuberculin reaction was positive. Following the hemorrhage, proliferative retinitis set in, destroying the sight of the right eye, but leaving him vision of $\frac{6}{8}$ in the left at the age of twenty-five years, when he was in good general health.

With reference to *traumatic hemorrhage* into the vitreous, Antonelli⁵ finds that recovery has never been complete, and that relatively good results are only attained after a long time. This he contrasts with the rapid and complete resorption of blood from other organs.

Vitreous Opacities. A very favorable experience in the treatment of vitreous opacities by the internal use of *thyroidin* is reported by Adler.⁶ He reports 4 cases of chronic opacities in which vision improved from light perception to $\frac{6}{24}$, from $\frac{6}{36}$ to $\frac{6}{18}$, and from $\frac{6}{18}$ to $\frac{6}{8}$. In 16 cases, where clouding of the vitreous was a symptom of uveal disease, improvement was noted in three-fourths. The thyroid extract is given after meals, and is to be well chewed, beginning with small doses and stopping whenever injurious effects are manifest.

¹ Archives of Ophthalmology, January, 1910.

² Ophthalmic Record, February, 1910.

³ Journal of the American Medical Association, October 9, 1909.

⁴ Archives of Ophthalmology, July, 1909.

⁵ La Clinique Ophtalmologique, June, 1909.

⁶ Klin. Monatsbl. f. Augenh., Schmidt-Rimpler Festschrift, p. 111.

RETINA, OPTIC NERVE, AND TRACTS.

Retinal Hemorrhage. So-called *subhyaloid* or *preretinal hemorrhage*, that is, hemorrhage from the retina which spreads between the retina and vitreous, sometimes behind the limiting membrane of the retina, at other times between that membrane and the hyaloid, Nagel¹ finds may arise from any cause of retinal hemorrhage, but it is particularly liable to occur with menstrual disturbances. He reports a case occurring in the right eye, with menstruation, and, twenty-eight days later, with the next menstruation in the left eye. Recovery in both eyes was complete. Full recovery frequently occurs after preretinal hemorrhage, although this is quite the reverse of what happens if the blood accumulates in the substance of the retina, or is poured out into the vitreous, as referred to above. Wiegmann² reports a case in which very extensive hemorrhage occurred at the seventh month of pregnancy, covering the whole region of the macula and optic disk, but not invading the vitreous, as shown by the absence of any cloudiness. In this case areas of retinal cloudiness remained, but four months after the termination of pregnancy vision had improved to $\frac{2}{3}$ of normal. Gruening³ also reports a case in which the hemorrhage extended partly over the optic disk.

Benedek,⁴ who reports 3 cases, finds that the hemorrhage is usually situated between the limiting membrane of the retina and the nerve fiber layer. He believes that there is a definite posterior limiting membrane of the retina, and hemorrhage breaking through the latter is very likely to make its way into the substance of the vitreous. He claims that these subhyaloid hemorrhages occur usually in the region of the macula, because the limiting membrane there is less adherent to Müller's fibers. Klauber,⁵ reporting on the examination of two eyes thus affected, points out that such hemorrhages do not usually extend over the optic disk, because the limiting membrane is more closely adherent to the disk than elsewhere to the retina.

A connection between *blood pressure and retinal hemorrhage* might naturally be assumed, and the observations of Fox and Batroff⁶ show that, in the majority of cases, retinal hemorrhage is associated with increased arterial tension. In 100 cases of retinal hemorrhage, they found that in 79 cases the arterial pressure ranged from 140 to 265 mm. In only 6 cases was the blood pressure distinctly low, 110 mm. or less; while in 15 cases it approximated the normal. The giving way of

¹ Journal Ophthalmology and Otolaryngology, January, 1909.

² Klin. Monatsbl. f. Augenh., Schmidt-Rimpler Festschrift, p. 111.

³ Archives of Ophthalmology, September, 1909, p. 513.

⁴ Graefe's Archiv f. Ophthalmologie, vol. lxx, p. 274.

⁵ Ibid., p. 299.

⁶ Colorado Medicine, May, 1909.

the vessel walls before abnormally high blood pressure is easy to understand. Perhaps low pressure may cause retinal hemorrhage, as it has been suggested increased coagulability of the blood might cause it, by causing thrombosis and subsequent giving way of vessels concerned in the collateral circulation.

Retinal hemorrhage, with *edema of the retina* and subsequent *atrophy of the optic nerve*, caused by severe *compression of the thorax*, is reported by Beal.¹ There was permanent impairment of vision in one eye, and the ophthalmoscopic symptoms were those of obstruction of the central retinal artery. Hemorrhage into the optic nerve sheath has been suggested as the explanation of somewhat similar cases heretofore. Beal believes that by enormous increase in blood pressure the inner coat of the central artery of the retina was ruptured, and that the curling up of the ruptured coat led to almost complete obstruction of the blood stream, and the permanent symptoms noted.

Retinal hemorrhage from *pressure during birth* is quite common, and is generally not followed by any serious permanent defect. Stumpf and von Sicherer² observed such hemorrhage in 42 out of 200 infants examined ophthalmoscopically shortly after birth, and about the same percentage has been noted by other observers.

Chronic Retinitis with Massive Exudation. A certain group of cases, in which the disease begins insidiously, show retinal hemorrhage as the earliest objective symptom, and end by the development of great masses of exudation or scar tissue in the retina; these may prove very puzzling upon first examination, or without a good case history. Two of these are reported by de Schweinitz.³ One occurred in a girl, aged nineteen years, the other in a man, aged sixty years. The appearances may suggest massive intra-ocular tubercle (see Kipp's case under Diseases of the Uveal Tract), but de Schweinitz could find no evidence of a tuberculous character in his cases, either in the family or personal history, or by the tuberculin tests. He thinks there is little doubt that his cases have the same basis as those associated with gross vascular disease. Instances of the latter have been reported by Wood,⁴ and Griffith and Ormond.⁵ In Wood's case there was extreme dilatation of some of the retinal vessels, suggestive of arteriovenous aneurysm; in one of the cases of Griffith and Ormond there was also an appearance of arteriovenous communication. These latter went on to secondary glaucoma and enucleation of the eye for supposed newgrowth. They occurred in sisters, and a sister of Wood's patient was supposed to be similarly affected.

¹ Annales d'oculistique, August, 1909.

² Beiträge f. Geburtshilfe u. Gynäkologie, vol. xiii, No. 3.

³ Transactions American Ophthalmological Society, vol. xii, pt. 1.

⁴ Transactions Ophthalmological Society United Kingdom, vol. xxix, p. 115.

⁵ Ibid., p. 279.

Retrobulbar Optic Neuritis. This condition, characterized by less definite and positive symptoms than we are accustomed to find in ocular disease, often passes unrecognized, or is the subject of an erroneous diagnosis. In reporting a case Claiborne¹ remarks: "This is the first case of retrobulbar optic neuritis that I have ever recognized, but I do not doubt that I have seen this affection many times without recognizing it." Reber² reports a case in which the original diagnosis, confirmed by an internist, was hysteria. The patient, a man of middle age, however, had a history of retrobulbar neuritis six years before. After watching the eye-ground daily for five days, haziness and swelling of the nerve head, with engorged lymph sheaths and veins, gave ground for the correct diagnosis. In Reber's case, and also in Claiborne's, there was a history of soreness in the orbit, and of a previous exposure to cold. In a case reported by Farid,³ the patient had spent a night in the fields cutting the crops, and lumbago had developed with the loss of sight.

The *prognosis* in these cases is especially interesting. Although in its early course the attack rapidly causes practical blindness, usually blindness at the centre of the field with retention of peripheral vision, the ultimate result is usually quite good. Of 9 cases reported by Stirling,⁴ 4 recovered vision of $\frac{6}{6}$ or better, and 4 of $\frac{6}{9}$, while the remaining case was still under treatment and improving. In Claiborne's case, vision had improved from $\frac{2}{100}$ to $\frac{20}{30}$ at the end of the first month, and Reber's patient recovered full vision. There was great improvement in Farid's case, but a central scotoma remained. The possible connection of retrobulbar neuritis with multiple sclerosis, which it may precede by many years, has been previously referred to.⁵ It is again discussed by Schieck.⁶

The important *relation of inflammation in the nasal accessory sinuses to retrobulbar ocular neuritis* is just now receiving wide attention. Loeb⁷ publishes a minute anatomical study of 15 heads, as to the relations of the optic nerve to the nasal sinuses. He finds that the optic chiasm is usually in relation with one or both sphenoid sinuses, lying posterior to the sphenoid cavity in half of the heads. More than half of the nerve is embraced in the sinus portion; 17 to 33 mm., as against 12 to 28 mm. in the free portion. As a rule, the posterior ethmoid cell has a slight relation with the optic nerve. The frontal sinus does not come in close relation with it, and the roof of the maxillary sinus does not reach nearer than 7 mm. from the optic nerve. Krauss⁸ reports

¹ American Journal of Ophthalmology, January, 1909.

² Ophthalmoscope, July, 1909.

³ Ibid., September, 1909.

⁴ Ibid., March, 1909.

⁵ PROGRESSIVE MEDICINE, June, 1909.

⁶ Graefes Archiv f. Ophthalmologie, lxxi, Heft 3.

⁷ Annals of Otology, Rhinology, and Laryngology, June, 1909.

⁸ Ophthalmic Record, May, 1909.

a case of unilateral retrobulbar neuritis due to ethmoiditis. After radical treatment through the nose, full vision was recovered. Paunz¹ records 6 cases, in 3 of which ethmoiditis is given as the cause, while in the other 3 the sphenoid was involved. In 4 vision was restored to normal, in 1 it was improved to $\frac{5}{15}$ and $\frac{5}{10}$; in the remaining case the patient remained blind after evacuation of the ethmoidal cells on both sides. Schieck includes among his cases 4 dependent upon disease of the nasal sinuses. He finds that with the ophthalmoscope such cases cannot be distinguished from retrobulbar neuritis due to other causes.

Optic Neuritis with Acute Disease. As a complication of the specific fevers, inflammation of the optic nerve or retina, or both, occasionally occurs. Clothier² reports a case of impairment of vision in a girl, aged sixteen years, appearing at the end of the second week of *typhoid fever*, so that she could only see the outlines of large objects. The ophthalmoscope showed neuroretinitis of both eyes; the nerve entrance was swollen and obscured, with faint radiating streaks toward the macula. Vision gradually improved, but was not normal at the end of six weeks. In a case reported by Vidal,³ which presented quite similar symptoms, appearing at about the tenth day of the fever, lumbar puncture was done and the improvement was rapid, the eye becoming normal in about a week.

Severe unilateral optic neuritis, with linear patches in the macula resembling albuminuric retinitis, is reported by Maklakow.⁴ Albumin was found in the urine, but in three weeks the ocular disease had subsided, leaving no trace. The result in Chevalier's⁵ case of optic neuritis following *mumps* was less favorable. The attack of mumps had been severe. Dimness of vision was noted within three weeks, and steadily increased. At the end of two years there was white atrophy of both optic nerves, and vision was reduced to about $\frac{1}{50}$. This complication of mumps, although not frequent, has been noted often enough to be borne in mind in connection with the disease, often not regarded as serious.

Decompression for Choked Disk. The importance of some decompression operation for the relief of choked disk begins to be appreciated among ophthalmologists, although the exact status of such a procedure is not so generally understood as seems desirable. Muskens⁶ points out that serous meningitis, occurring in young children, may closely simulate brain tumor, and after causing total blindness may terminate

¹ Archives of Ophthalmology, January, 1909.

² New York Medical Journal, April 10, 1909.

³ Bulletin et Mém. de la Soc. Méd. des Hôpitaux de Paris, 1909, p. 366.

⁴ Klinische Monatsblätter f. Augenheilkunde, February, 1909.

⁵ L'opht. Prov., No. 1, 1909.

⁶ Nederl Tijdschr., vol. ix, p. 1162.

in recovery. Of blind children, 20 per cent. have become so not through ocular lesions, but through intracranial disease causing increased intra-ocular pressure. Even though a patient be doomed to early death by inoperable brain tumor, his unhappy plight should not be aggravated by blindness. Unnecessary delay has diminished the good thus far accomplished by operations to relieve intracranial pressure; and yet the results up to the present time fully justify operative interference. De Schweinitz and Holloway¹ have collected the cases reported in American literature; among 161 thus brought together, they find 62 reported with sufficient detail as to ophthalmic conditions and visual results to serve as a basis for conclusions. Of 37 radical operations, 16 operations were followed by decreased swelling of the disk and improvement in vision, 6 patients preserved their remaining vision, 7 showed temporary improvement, and 8 were unimproved. After 27 exploratory operations, 7 patients were improved, 2 preserved the remaining vision, 7 obtained temporary improvement, and 11 patients were unimproved or died shortly after. Of 34 operations done simply for decompression, 21 were followed by decreased swelling and improved vision, 5 preserved the vision present, and 8 were reported unimproved. De Schweinitz and Holloway conclude that for choked disk depending upon increased intracranial pressure, decompressive trephining is the most satisfactory treatment, and that this operation should be performed early when the prognosis as to sight is most favorable. Even in the later stages it may preserve the vision present. They think that in non-syphilitic cases the time devoted to a trial of iodides and mercurials is wasted.

Paton² thinks that in optic neuritis due to cerebral tumors, if palliative trephining has to be done to save vision, this need not be done with the first development of the neuritis, but on the first sign of visual failure. De Schweinitz and Holloway point out that the investigation of the eyes must include, besides ophthalmoscopic examination, careful estimation of the visual field, the light sense, and the size of the blind spot. Charles³ has written upon the influence of the field of vision in determining for or against palliative operation in these cases. He reports 2 cases in which improvement of the field, in spite of diminishing vision and other symptoms of unfavorable progress, led to persistence in the use of mercurials, which was ultimately justified by improvement in all respects.

¹ Transactions of the Section on Ophthalmology, American Medical Association, p. 222.

² Ophthalmoscope, March, 1909.

³ American Journal of Ophthalmology, June, 1909.

LIDS, LACRYMAL APPARATUS, AND ORBIT.

Lid Movements. One of those cases in which the raising of the upper lid is very closely associated with the depression of the lower jaw has been reported by Souques.¹ In this case there was present a slight ptosis. Souques seems to adopt the explanation offered by Harman, that in the lower orders of vertebrates permanently, and in the higher vertebrates at an early stage of development, the nuclei controlling these two movements, and the movements themselves, in so far as they are developed, are very intimately associated. Although in normal human development they subsequently become dissociated, as an anomaly this dissociation may not occur; if the movements are weakened, as in a case of ptosis, requiring especial effort, the association of movements is likely to reappear. In a case reported by Cantonnet² there were evidences of left facial paralysis, with ptosis and double vision. The lids could not be raised alone, but opened widely when the jaw was depressed.

Harman³ now reports a case of *congenital defect of lid movement*, best explained by supposing that there is incomplete separation of the superior rectus muscle from the elevator of the upper lid. A lack of normal association between the movement of the upper lid and eyeball, resembling the Graefe sign of exophthalmic goitre, is reported by Morax.⁴ The patient was a man, aged forty-seven years, in whom the symptom had been noted from infancy. The eyeballs moved normally together, but upon looking down, the left lid failed to move with the eyeball, and was, at times, retracted. The patient noticed no inconvenience.

Sporotrichosis. Although sporotrichosis involving the lids is probably not very common, several cases have been reported within the last year. The resemblance which such cases may bear to syphilis and tuberculosis makes some knowledge of this condition important. Fava⁵ accidentally inoculated himself, and noticed the first lesions on the conjunctiva at the end of eleven days, with involvement of the lids three days later. On the conjunctiva, small yellowish-white prominent spots were noted, which were slightly sensitive to pressure. On the lid there occurred an inflammation of one of the hair follicles. Burnier⁶ reports the formation of nodules beneath the skin which give the sensation of a cherry stone. The maxillary and pre-auricular glands become enlarged. Aurand⁷ made an extended experimental study, and found

¹ Annales d'oculistique, September, 1909, p. 220.

² Archives d'ophtalmologie, April, 1909.

³ Transactions Ophthalmological Society United Kingdom, vol. xxix, p. 150.

⁴ Annales d'oculistique, February, 1909.

⁵ Ibid., May, 1909.

⁶ Ibid.

⁷ Revue Générale d'Ophtalmologie, June, 1909.

that, in rabbits, inoculations with the *Sporotrichum beurmanni* caused the formation of growths resembling gummas under the conjunctiva; an inflammation resembling aspergillus keratitis in the cornea; gumma-like swellings, or lesions resembling tubercles in the iris from inoculation of the aqueous; and a miliary sporotrichosis of the choroid and retina, with pigment disturbances and atrophies, from inoculation of the vitreous. He found all these lesions rather benign, tending to recovery with some permanent damage of the tissues involved. The cases occurring in man have also a favorable prognosis. The lesions have all seemed to yield to the internal administration of potassium iodide, except one case in which the eye was lost by panophthalmitis.

Galvanopuncture for Entropion and Ectropion. Many plastic operations have been devised for the relief of these deformities of the lid. Ziegler¹ claims that puncture with the galvanocautery, on the surface of the lid where contraction is desired, will relieve spastic or relaxed entropion or ectropion, paralytic ectropion, cicatricial contraction, if moderate, contraction from lacrymal irritation, or distichiasis. After the use of a 4 per cent. solution of cocaine in the conjunctiva, a lid clamp is applied with the straight bar on the conjunctival surface for ectropion, on the skin surface for entropion (6 mm. from the lid margin). The small cautery point is pressed firmly against the conjunctiva or skin, and the current applied until it is quickly pushed through the cartilage, when it is withdrawn. The punctures are made 4 mm. from the lid margin and 4 mm. apart. If necessary, this operation can be repeated at intervals of from two to four weeks. Risley, who has adopted the procedure for entropion with admirable results, dresses the eye by simply spreading collodion over each of the punctures. He encountered no noticeable reaction and no scar. Zentmayer, who reports an experience with 6 cases, found the immediate effect most gratifying. He has injected cocaine into the lid before the operation, and had little complaint of pain from it.

Lacrymal Obstruction. A most important reason for the efficient treatment of this condition is the fact that, with obstruction of the lacrymal passages, the sac becomes a hotbed for the development of pathogenic bacteria, so that the slightest injury to the cornea is liable to result in an infection which may destroy the eye. Calderaro² has studied the bacterial flora of the conjunctiva, before and after incision of the sac, noting the forms present, their number, and the virulence of the cultures obtained. He found that within the first few days after the excision of the sac there is shown a marked diminution in the number and the virulence of the bacteria; if, however, the eye is kept bandaged for a few days, they increase in number and virulence.

¹ Transactions of the Section on Ophthalmology, American Medical Association, 1909.

² La Clinica Oculistica, August, 1909.

After a few months the pathogenic germs disappear entirely, leaving only the usual saprophytes. Calderaro found division and probing of lacrymal strictures less effective than removal of the sac. Removal of the lacrymal gland, diminishing the secretion of tears, seemed to favor the development of pathogenic bacteria. In 10 cases of *acute dacryocystitis*, Casali¹ generally found streptococci in the pus, frequently in pure culture. He also found, although rarely, Friedländer's diplobacillus, the colon bacillus, and the staphylococcus. In 50 cases of *chronic dacryocystitis* the most common organism was the diplococcus of Fraenkel. After this, in the order of frequency, came the staphylococcus, colon bacillus, and Friedländer's diplobacillus.

Instead of removing the lacrymal sac, when less radical treatment has failed or is not practicable, Toti² has proposed the formation of a direct passage from the lacrymal sac into the ethmoid cells and through them to the nares. He cuts down upon the sac, removes a portion of the inner wall, turns back the periosteum, works through the bone, and, finally, removes a portion of the nasal mucous membrane. In some cases it is necessary to remove a part of the turbinal. He reports 40 cases treated in this way with satisfactory results. Sym, in reviewing Toti's paper, calls attention to the fact that in some cases of chronic abscess of the sac the passage into the nose is already open. In these cases it is doubtful whether any substitute for removal of the pyogenic membrane would prove effective.

Toti's operation is somewhat tedious and difficult. Gifford³ has simplified it by using a cutting forceps or punch. The flat blade can be introduced into the nose; the other blade, acting against it as a punch, removes whatever bone may be necessary. For the operation, the mucous membranes are cocaineized, the upper canaliculus is slit, and a cross-incision made into the sac to allow the punch to enter freely. Gifford has used the operation in 6 cases with good immediate result, but the opening showed some tendency to close. He thinks, however, that it would be easy to teach the patient to probe such an opening, and the operation is much simpler than excision of the sac.

Orbital from Dental Disease. We have learned to look to the nasal accessory sinuses as likely to furnish causes for orbital disease. But, without involving these, it is possible for dental disease to cause inflammation extending into the orbit. Morax⁴ reports two cases which justify such a conclusion. In one case chronic disease of the alveolus existed about the right lateral upper incisor. The patient presented a swelling that looked like a prelacrimal abscess of the right side. A fistula extended from this swelling down to denuded bone on the front of

¹ Recueil d'ophtalmologie, August, 1909.

² Ophthalmic Review, October, 1909, p. 287.

³ Ophthalmic Record, October, 1909.

⁴ Recueil d'ophtalmologie, June, 1909.

the superior maxilla, near the root of the affected tooth. The bacterial contents of the lesion corresponded to those of the mouth, and differed widely from the bacteria found in the lacrymal sac. In the second case, the second premolar was at fault. In discussing the above cases, Cantonnet reported an abscess of the lower lid arising from disease of the canine tooth.

Vigier¹ records a case in which orbital abscess occurred in a child, aged two months, with abscess surrounding a large upper tooth. Opening of this abscess and extraction of the tooth cured the orbital condition in ten days. A month later a new swelling of the lower lid and cheek occurred. Another large molar tooth was found to have appeared. In this case the same bacterial flora were found in the orbital abscess as in the abscess surrounding the tooth. Harman² has also reported, in connection with dental caries, the development of mucocele of the lacrymal sac in one case, and of a malar abscess extending into the orbit in another case.

INJURIES.

Disappearance of Iris after Injury. The partial or complete disappearance of the iris after an injury to the eye is sometimes puzzling. It may occur after simple contusion, after perforation of the globe, or even after an operation. In this latter case the iris has sometimes been dragged out of the eye by a sudden movement of the globe after it had been seized with forceps, without the operator noticing just what had occurred. The different ways in which the disappearance of the iris may come about through accidental trauma have been pointed out by Mayou.³ With rupture of the sclera, the iris may be extruded with the lens, and thus wholly removed. This is not incompatible with subsequent useful vision. Occasionally the iris has been forced out without extrusion of the lens, being apparently torn away from its ciliary attachment by the rush of aqueous humor. More frequently, a partial disappearance of the iris is caused by its incarceration in the rupture or wound. In rare cases the iris disappears by doubling backward on the ciliary body. Mayou believes that this is always associated with a forward dislocation of the lens.

In one of Mayou's cases, the root of the iris was displaced backward with the ciliary body, close to the equator of the eyeball. In another case it was folded back and retracted by the contraction of inflammatory exudate thrown out upon its surface. In a case reported by Oguchi,⁴ the backward displacement of the ciliary body and root

¹ Recueil d'ophtalmologie, March, 1909.

² British Medical Journal, August 7 and September 25, 1909.

³ Transactions Ophthalmological Society United Kingdom, vol. xxix, p. 254.

⁴ Klinische Monatsblätter f. Augenheilkunde, June, 1909.

of the iris below caused the appearance of an iris coloboma. Guilford¹ reports a case of penetrating wound of the cornea, with some contusion of the globe, in which, when the blood was absorbed from the anterior chamber, it was discovered that the iris had been completely torn away at the time of injury. The lens was uninjured, and eight months after the injury vision was $\frac{20}{30}$.

Recovery from Severe Injuries. The ability of the eye to recover from what might be supposed to be a fatal laceration should be borne in mind, as well as the danger of the loss of an eye through infection of a wound that appears at first quite trivial. The power of recovery is illustrated in a case reported by Terson.² A man had his eye lacerated by his glasses, which had been broken in a fall. He presented himself, three days later, with nearly all of the iris hanging from a wound in the ciliary region and cornea, and lying upon the lashes of the lower lid. The wound, beginning 5 mm. back of the corneoscleral margin, extended through the ciliary body and three-fourths of the distance across the lower part of the cornea. The iris was cut off, the wound disinfected, and brought together with two sutures. The patient recovered almost normal vision. Patterson³ saw a case of injury by a hatpin, where there was a ragged wound at the temporal margin of the cornea and a counterpuncture in the sclera 3 mm. back of the limbus, to the nasal side. A large amount of iris protruded from the wound of entrance. This was excised, and the eye recovered with good vision.

Traumatic Dislocation of Eyeball. Tearing of the eyeball out of its socket is a rare injury, yet five different cases have been reported in the last year. Chevallereau and Liegard⁴ saw a man who, after a convivial evening, struck his eye on a projecting piece of wood when getting into bed. He felt with his hand a hard lump below the eye, but did not investigate until the next morning; he did not consult an oculist until the day after that. When he came under observation the lower lid was found to be torn and the eyeball lying upon it, hanging by the external and inferior recti, and the inferior oblique muscles. It could still turn down or out; 28 mm. of optic nerve was attached to the eyeball.

Williams⁵ reports a case in which a man walking in the dark ran against the end of a piece of gas-pipe projecting from a wagon. When seen two hours later, two clean-cut wounds were found at the upper and lower margins of the orbit. The globe, itself uninjured, lay on the cheek, connected with the orbit only by the external rectus muscle.

¹ Ophthalmic Record, December, p. 579.

² La Clinique Ophtalmologique, January, 1909, p. 29.

³ Ophthalmic Record, April, 1909, p. 189.

⁴ Archives d'ophtalmologie, May, 1909.

⁵ Annals of ophthalmology, July, 1909.

The optic nerve had been divided 7 mm. behind the globe. In discussing the above case, Harbridge reported one. A woman, falling in an epileptic seizure, struck a stick, tearing out the eyeball with 4 or 5 mm. of optic nerve, the globe remaining attached by a few strands of the inferior rectus muscle. The patient of Delord and Bernardou¹ fell against a projecting hook. The eyeball was dislocated, the lids being tightly closed behind it. All the muscles appeared to be divided, the globe remaining attached only by the optic nerve. Hemorrhage was comparatively slight.

This mutilation has sometimes been self-inflicted by insane patients. Lundsgaard² reports a case where two female inmates of a hospital for the insane had been left alone together for two minutes. One emerged from the room with both orbits bleeding, her left eye having been dropped on the stairway as she came out, while the right hung by the internal rectus. The optic nerve of the left eye had been torn through 5 cm. behind the eyeball. The bloody hands of the other patient showed how the injury had been wrought, without the use of any other weapon.

REFRACTION AND ACCOMMODATION.

Myopia. Analyzing the mechanical processes through which the increased length of the eyeball is developed, causing myopia, Halben³ points out that contraction of the recti muscles produces distention only in the posterior half of the eyeball. Anteriorly, the firm cornea and sclera, reinforced by the tendons of the recti muscles and Tenon's capsule, besides support from the ciliary muscle and iris sphincter, adapt the outer coat of the eyeball to resist the intra-ocular tension. Heine⁴ believes that the essential point in the production of myopia is a weakness of the sclera, which he ascribes to tears in the elastic lamina of the choroid. Whether there is a myopia originating in the requirements of school life is seriously questioned by Vergne.⁵ He finds that the percentage of myopia is nearly as high among pupils in the country districts as in those attending city schools. A comparison of the statistics of illiterate recruits from the different provinces of France, with the prevalence of myopia in the same regions, leads him to conclude that any causal relation of school life to myopia is not proved.

Notation of Astigmia. Attempting to make the records of meridians of astigmia bilaterally symmetrical, the Naples International Congress

¹ L'opht. Prov., April, 1909.

² Klinische Monatsbl. f. Augenheilkunde, February, 1909.

³ Graefe's Archiv f. Ophthalmologie, lxxi, p. 283.

⁴ Archives d'ophtalmologie, May, 1909.

⁵ Annales d'oculistique, April, 1909.

of Ophthalmology recommended that the numbering should begin with zero at the nasal end of the horizontal meridian for each eye, running upward on the superior semicircle, to 180 degrees at the temporal end, as suggested by the late Dr. George C. Harlan fifteen or twenty years ago. This would reverse, for the left eye, the method of numbering now generally in use in America, while retaining that method for the right eye. The suggestion has not, however, been received with general favor. Maddox,¹ Stephenson,² Oppenheimer,³ and others point out the advantages of the notation now employed in America, which corresponds to the universal custom of mathematicians in designating angles, as more useful and practical; and that it escapes the confusion which is already illustrated in the practice and writings of those who employ other methods.

Paralysis of Accommodation following Diphtheria. This symptom Henderson⁴ ascribes to an inflammatory neuritis, involving the terminal filaments in the ciliary muscle; which may be due to their exposure to a poisoned blood in the vascular ciliary body. He thinks that excessive use of the accommodation during convalescence may be an exciting cause. Müller⁵ believes that postdiphtheritic paralyses are more frequent since antitoxin has come into general use, because more of the severe cases survive the attack. He has seen 30 cases of paralysis of accommodation within six months, in 23 of which antitoxin had been administered. In the antitoxin cases the paralysis seemed to begin later than in those which did not receive the antitoxin.

OCULAR MOVEMENTS.

Lifting Power of Ocular Muscles. A great deal has been said and written about excessive or deficient strength of particular muscles that turn the eye in different directions. As a matter of fact, until very recently little has been known of the actual strength of these particular muscles. Howe⁶ has worked out the plan of attaching forceps to the tendon of insertion, under a local anesthetic, and connecting these by a thread running over a roller, to test what weight the muscle is capable of lifting. He finds that the adductors are thus able to support a weight of from 10 to 18 grams. While the method has so far been applied only in laboratory experiments, Howe thinks that its clinical use would give important evidence as to whether tenotomy or advancement should be done for a given case of squint.

¹ Ophthalmoscope, December, 1909.

² Ibid., October, 1909.

³ Wochenschrift f. Therap. u. Hyg. d. Auges, March, 4, 1909.

⁴ American Journal of Ophthalmology, April, 1909.

⁵ Klin. Monatsbl. f. Augenh., Schmidt-Rimpler Festschrift, 1909, p. 134.

⁶ Transactions Eleventh International Congress on Ophthalmology, at Naples.

Congenital Defects of Movement. In a case reported by Galeczowski,¹ the movements of both eyes to the right were normal, but during these movements the left palpebral fissure was narrowed and the left eyeball retracted. Looking to the left was difficult. The left eye turned very slightly in that direction, and the effort was quickly given up, the eyes turning to the front or to the right. The left externus was probably replaced by inextensible tissue, the result of orbital inflammation during intra-uterine life. Harman² reports a condition which he ascribes to incomplete differentiation of the superior rectus from the elevator of the upper lid, a condition normal to some of the lower animals. The patient could fix with either eye. When the right fixed, the left upper lid dropped 3 mm. and the left eye turned down and in. When the left eye fixed, the right turned up and in. The upward movement of the right eye was somewhat limited.

Franke³ reports 2 cases exhibiting a syndrome first described by Axenfeld and Schurenberg.⁴ This makes 10 reported cases, the characteristics of which are: A congenital palsy, or one developed in very early life, of some of the extra-ocular branches of the oculomotor nerve. The muscles supplied by the branches involved exhibit periodical spasmodic contractions, occurring at short, almost regular, intervals. With this there is rhythmic contraction and dilatation of the pupil. The cause of the condition is assumed to be a focal lesion close to the nucleus of the oculomotor nerve.

Nystagmus. Buys and Coppez,⁵ by a simple apparatus invented by the former for attachment to the eye, have obtained tracings of the movements of the eyeball in nystagmus. A study of a series of cases by this method shows two distinct classes of movements. In one, the eye swings back and forth at the same rate. In the other, it moves very quickly in one direction, and comparatively slowly in the other. Miner's nystagmus belongs to the first class called "*pendulatory*," from its resemblance to the swinging of a pendulum. The nystagmus produced by aural conditions, or cerebellar disease, is of the second class.

Mackenzie⁶ has also recognized that the nystagmus of labyrinthine disease consists of a slow movement, followed by a short twitch back. Turning the eyes in the direction of the short movement increases the nystagmus. Turning them in the direction of the slow movement lessens it or causes it to cease. Ormond⁷ points out that nystagmus showing the characteristics of the labyrinthine form should lead to examination of the ears.

¹ Transactions Société d'ophtalmologie de Paris, p. 42.

² Transactions Ophthalmological Society United Kingdom, vol. xxix, p. 150.

³ Klin. Monatsbl. f. Augenh., November, 1909.

⁴ Ibid., January, 1901.

⁵ Archives d'ophtalmologie, December, 1909.

⁶ Practitioner, May, 1909.

⁷ Ophthalmoscope, April, 1909.

INDEX.

A

ABDOMEN, surgery of, 73
 Abdominal cavity, sensation in, 73
 crises in diabetes, 310
 herniæ, relation of laparotomy scars to, 54
 operations, how to prevent adhesions after, 209
 undetached pads and sponges in, 197
 wall, resection of excessive fat from, 202
 Abscess, subphrenic, 86
 Accommodation, paralysis of, following diphtheria, 352
 refraction and, 351
 Acetone treatment of cancer of uterus, 174
 Acidosis, 304
 is diabetic coma due to, 306
 postanesthetic, 307
 postmortem findings in, 307
 tests for, 304
 Acute intestinal obstruction, 90
 pancreatitis, diagnosis of, 143
 Cambridge's reaction in, 143
 treatment of, 145
 Addison's disease, 255
 etiology of, 255
 symptoms of, 256
 treatment of, 258
 Adenocystoma-pseudomucinosum of the ovary, 188
 Adenocystomas of ovary, 188
 Adhesions, how to prevent, after abdominal operations, 209
 peritoneal, disappearance of, 88
 meaning of, 212
 visceral, symptoms from, 207
 Adrenalin, influence of, upon intra-ocular tension, 338
 injections in peritonitis, 84
 Adrenals, relation of, to glycosuria, 296
 Adults, umbilical hernia in, etiology of, 34
 operation for, 36, 37
 pathology of, 34
 Air of operating room, 194
 Alternating electric current in obesity, 260
 Amputation of rectum for rectal cancer, 126
 Anal fissure, high frequency currents in, 128
 Anastomosis, enterorectal, 109
 Anemia, pernicious, 231

Anemia, pernicious, age in, 233
 antitryptic strength of blood serum in, 237
 blood in, 234
 color index in, 236
 conditions producing, 236
 diagnosis of, differential, 238
 enlargement of spleen in, 235
 etiology of, 231
 nervous symptoms of, 235
 pigmentation of skin in, 235
 retinal hemorrhages in, 237
 staining characteristics in, 237
 symptoms of, 235
 temperature in, 235
 treatment of, 239
 arsenic in, 240
 chloroform in, 240
 cholesterin in, 240
 iron citrate in, 240
 irrigation of bowel in, 239
 transfusion in, 239
 Anesthesia, local, for operations on uterine cervix, 196
 lumbar, 55
 urinary excretion during, 193
 Anesthetics, ocular, 328
 for rectal surgery, 112
 Angioneurotic edema, Henoch's purpura with, 287
 Anisocoria, 335
 Antidiphtheritic serum in suppurating ulcer of cornea, 332
 Antipneumococcic serum in suppurating ulcer of cornea, 332
 Antithyroidin in exophthalmic goitre, 279
 Antitrypsin in blood of dietetics, 302
 Apparatus for proctoclysis, 85
 Appendectomy, mortality after, 104
 Appendix, 104
 operations, postural drainage for, 200
 Arsenic in pernicious anemia, 240
 Astigmatia, notation of, 351
 Atropine in treatment of diabetes, 318

B

BACKACHE from static disorders, 222
 Bacterial toxins in treatment of leukemia, 254
 Ball valve, gallstones as a, 139
 Bassini operation, 52
 Bile duct, cancer of, 142
 dilated common, 139

Bile tracts, incision for, 140
 Biliary passages, 129
 reestablishment of, 132
 Bismuth injections for fistula in ano, 118
 Blood, 231
 antitrypsin in, of diabetics, 302
 in hemophilia, 289
 in pernicious anemia, 234
 pressure and retinal hemorrhage, 341
 serum, antitryptic strength of, in pernicious anemia, 237
 Bowel, irrigation of, in pernicious anemia, 239
 Bread, diabetic, 318

C

Cambridge's reaction in acute pancreatitis, 143
 Cancer of bile duct, 142
 of Fallopian tube, primary, 187
 of rectum, 125
 of uterus, 147
 acetone treatment of, 174
 cystoscopy in, 162
 early diagnosis of, 157
 education about, 160
 metastases of, 153
 to adrenals, 155
 to bones, 154
 symptoms of, 154
 to kidneys, 156
 to liver, 155
 to lungs, 156
 to pancreas, 155
 to peritoneum, 154
 to pleura, 156
 to skin, 156
 to spleen, 154
 to thyroid gland, 155
 operability of, 162
 operation for, choosing type of, 167
 results of, 169
 technique of, 166
 postoperative cystitis, 172
 prevalence of, 157
 secondary, 156
 technique of operation for, 166
 treatment of, medical, 173
 Carbohydrate, conversion of, into fat, 302
 destruction, influence of thyroid upon, 299
 Carbon dioxide, cause of decreased, in blood in diabetic coma, 306
 Carcinoma, gastric, relationship of gastric ulcer and, 97
 of sigmoid, 110
 Cardiac palpitation in exophthalmic goitre, 273
 Cardiovascular lesions in gout, 323
 Cataract, causes of, 338
 extraction of, in capsule, 339
 Cecum, inguinal hernia of, 64
 Cervix, carcinoma of, disinfection of, 163
 Children, diabetes in, 309
 operative treatment of inguinal hernia in, 52

Chloroform in pernicious anemia, 240
 Chloroma, 246
 Choked disk, decompression for, 344
 Cholecystenterostomy en Y, 132
 Choledcho-enterostomy, 133
 Cholesterin in treatment of pernicious anemia, 240
 Choroiditis, chronic, tuberculosis with, 336
 Cirrhosis, hepatic, Talma operation in, 87
 Clamp and cautery operation for hemorrhoids, 120
 Colectomy, 108
 Colopexy, 107.
 Color index in pernicious anemia, 236
 Coma, diabetic, cause of decreased carbon dioxide in blood in, 306
 is it due to acidosis, 306
 Conditions producing pernicious anemia, 236
 Conjunctiva, diseases of, 329
 Conjunctivitis, gonorrheal, metastatic, 330
 Conversion of carbohydrate into fat, 302
 Cornea, diseases of, 331
 family degeneration of, 334
 opacities of, 334
 oval, of inherited syphilis, 334
 ulcer of, serpent, 331
 suppurating, 331
 kerotomy in, 332
 serum therapy in, 332
 treatment of, 332
 Corneal opacities, 334
 Cosmetic effect of laparotomy, 89
 Cretinism, 265
 Crises, abdominal, in diabetes, 310
 Cryptorchism, 58
 Crystalline lens, 338
 Cyclodialysis for glaucoma, 338
 Cystocele, new operation for, 206
 Cystoscopy in cancer of uterus, 162

D

DACRYOCYSTITIS, acute, 348
 chronic, 348
 Dalrymple's sign of exophthalmic goitre, 275
 Death rate in diabetes, 308
 Decompression for choked disk, 344
 Dental disease, orbital from, 348
 Dermoid tumors of ovary, 188, 193
 Diabetes, abdominal crises in, 310
 in children, 309
 death rate in, 308
 in exophthalmic goitre, 276, 298
 gangrene of breasts in, 311
 geographical distribution of, 308
 from infectious pancreatitis, 296
 mellitus, 291
 pathological anatomy of pancreas in, 291
 pathology of, 291
 metabolism in, 299
 pancreatic, 295
 glycemia in, 302
 lipemia in, 295

Diabetes, possibility of preventing, 308
treatment of, 311
atropine in, 318
diabetic bread in, 318
milk in, 318
diet in, 311, 312
drugs in, 312
effect of, on prognosis in, 319
Falta's test diet in, 314
general, 311
oatmeal cure in, 315, 317
pancreatic secretion in, 319
pankreatin in, 314
Diabetic, antitrypsin in blood of, 302
coma, is it due to acidosis, 306
Diathetic diseases, 231
Diet in diabetes, 311, 312
potato, in obesity, 260
Digestion, emotions and, 96
Dilatation, gastric, 90
of stomach, acute postoperative, 218
Dilated common bile duct, 139
gall-bladder, 136
Disinfection of cancer of uterine cervix, 163
local, 196
Diverticulitis of sigmoid, 110
Drainage and care of laparotomy wound
after peritonitis, 80
postural, for appendix operations, 200
Drugs, influence of, on intra-ocular tension, 337
Dry heat as a therapeutic agent, 228
Duodenal ulcer, 96
Dysmenorrhea and sterility, 182

E

EARLY diagnosis of cancer of uterus, 157
rising after operation, 214
Echinococcus cysts, "formalage" of, 142
Ectropion, galvanopuncture for, 347
Edema, angioneurotic, Henoch's purpura with, 287
Education about cancer of uterus, 160
Electric current, alternating, in obesity, 260
Electrical treatment of exophthalmic goitre, 280
Electrolysis in exophthalmic goitre, 280
Emotions and digestion, 96
Endometrium, normal variations in structure of, 227
Enterorectal anastomosis, 109
Entropion, galvanopuncture for, 347
Epibulbar subconjunctivitis, 330
Epigastric hernia, 45
Epilepsy in gout, 324
Eruptions of skin in gout, 325
Excision for hemorrhoids, 119
Exclusion of colon, 108
Exophthalmic goitre. *See* Goitre.
Exophthalmos in exophthalmic goitre, 274
Extra-uterine pregnancy, symptoms of, 186
Eye, injuries of, 349
Eyeball, dislocation of, traumatic, 350

F

FALLOPIAN tube, primary cancer of, 187
Falta's test in diabetes, 314
Family degeneration of cornea, 334
Fat, resection of excessive, from abdominal wall, 202
Female, inguinal hernia in, 23
oblique, 23
direct, 23
etiology of, 24
indirect, 23
interparietal, 33
interstitial, 25
results of operation for, 33
treatment of, 31
operative, 32
unusual cases of, 25
properitoneal hernia in, 27
Fibroids of ovary, 188
Filigree method of operation for umbilical hernia, 37
Fissure, anal, high frequency currents in, 128
Fistula in ano, bismuth injections for, 118
Flies, ocular infection by, 330
"Formalage" of echinococcus cysts, 142
Fowler-Murphy treatment of peritonitis, 85

G

GALL-BLADDER, dilated, 136
influence of, on postoperative nausea and vomiting, 213
strangulated, 136
torsion of, 138
gangrene following, 138
wandering, 136, 138
Gallstone as a ball valve, 139
Gangrene of breasts in diabetes, 311
following torsion of gall-bladder, 138
Gastric dilatation, 90
ulcer, perforated, 96
relationship of, and gastric carcinoma, 97
Gastro-enterostomy, results of, 92
Gifford's sign of exophthalmic goitre, 275
Glaucoma, 237
operations for, 338
Glucose, toxicity of, 302
Glycemia in pancreatic diabetes, 302
Glycolytic enzyme in pancreas, 303
Glycosuria, alimentary, thyroidectomy in, 298
in gout, 324
non-diabetic, 300
in pregnancy, significance of, 309
relation of adrenals to, 296
of islands of Langerhans to, 293
of thyroid to, 298
respiratory metabolism in, 301
sodium chloride, 303
Goitre, exophthalmic, 267
cardinal lid signs in, 275
diabetes in, 276, 298
etiology of, 268
exophthalmos in, 274

- Goitre, exophthalmic, influence of, upon
 pregnancy, 278
 intra-ocular changes in, 275
 muscular tremor in, 276
 nervousness in, 276
 ocular muscle signs in, 275
 signs in, 275
 palpitation in, 273
 pathology of, 271
 prognosis of, 278
 symptoms of, 273
 thyroid gland in, 274
 treatment of, 278
 antithyroidin in, 279
 electrical, 280
 electrolysis in, 280
 extract of thymus gland in, 280
 Rodagen in, 279
 Röntgen rays in, 280
 serum therapy in, 278
 sour milk in, 281
- Gonorrheal conjunctivitis, metastatic, 330
- Gout, 320
 cardiovascular lesions in, 323
 changes in nervous system in, 324
 etiology of, 320
 glycosuria in, 324
 joint changes in, 322
 skin changes in, 324
 throat changes in, 324
 treatment of, 325
- Gynecology, 147
- H**
- HALL's operation for hemorrhoids, 123
- Heart, palpitation of, in exophthalmic goitre, 273
- Heat, dry, as therapeutic agent, 228
- Heitzmann's operation for hemorrhoids, 122
- Hemophilia, 75, 288
 blood in, 289
 etiology of, 288
 pathology of, 289
 ■ symptoms of, 288
 treatment of, 290
 serum in, 290
- Hemophilic as a surgical patient, 75
- Hemorrhage, hepatic, control of, 129
 preretinal, 341
 retinal, 341
 blood pressure and, 341
 from compression of thorax, 342
 from pressure during birth, 342
 in pernicious anemia, 237
 subhyaloid, 341
 vitreous, 340
 non-traumatic, 340
 traumatic, 340
- Hemorrhoids, clamp and cautery operation for, 120
 excision of, 119
 Hall's operation for, 123
 Heitzmann's operation for, 122
 ligature operation for, 120
 operations for, 119
- Hemorrhoids, Vernon operation for, 120
 Whitehead operation for, 120
- Henoch's purpura, 287
 differentiation of, from intussusception, 287
 with angioneurotic edema, 287
- Hepatic artery, ligation of, 130
 cirrhosis, Talma operation in, 87
 hemorrhage, control of, 129
- Hepatico-enterostomy, 134
- Hepatocholeloduodenostomy, 135
- Hepatocholelangoenterostomy, 136
- Hernia, 17
 abdominal, relation of laparotomy scars to, 54
 epigastric, 45
 contents of sac in, 46
 frequency of, 46
 prognosis in, 47
 size of, 46
 symptoms of, 47
 treatment of, operative, 47
 inguinal, of cecum, 64
 in children, operative treatment of, 52
 in female, 23
 direct, 23
 etiology of, 24
 indirect, 23
 interparietal, 33
 interstitial, 25
 oblique, 23
 results of operation for, 33
 treatment of, 31
 operative, 32
 unusual cases of, 25
 myoplasty for, 40
 inguino-interstitial, 30
 inguino-properitoneal, 30
 intraparietal ventral, at McBurney's point, 66, 70
 ischadic, 50
 diagnosis of, 51
 mortality in, 51
 prognosis of, 51
 symptoms of, 51
 varieties of, 50
 large, of linea alba, 202
 properitoneal, in female, 27
 rare types of, 66
 of recessus cecalis, 59
 results of operation for, 64
 retroperitoneal, of intersigmoid fossa, 66
 retroperitonealis Treitzii totalis accreta, 61
 strangulated, intestinal resection in, 19
 traumatic, 17
 umbilical, etiology of, 34
 Martin's operation for, 41
 operation for, 36
 filigree method of, 37
 pathology of, 34
- Hernial sac, primary tuberculosis of, 48
 etiology of, 49
 prognosis of, 50
 symptoms of, 49

High frequency currents in anal fissure, 128
 Hysterectomy, vaginal, new technique of, 201

I

INCISION for bile tracts, 140
 Incontinence of urine after labor, permanent, 221
 Infantile partial myxedema, 264
 scurvy, 281
 Infection, ocular, by flies, 330
 Inguinal hernia of cecum, 64
 in children, operative treatment of, 52
 in female, 23
 myoplasty for, 40
 Inguino-interstitial hernia, 30
 Inguino-properitoneal hernia, 30
 Injuries of eye, 349
 disappearance of iris after, 349
 recovery from, 350
 Instrument to hold intestines, 102
 Intestinal obstruction, 215
 acute, 90
 resection in strangulated hernia, 19
 strangulation without obstruction, 103
 sutures, influence of opium and physostigmine upon, 89
 Intestine, instruments to hold, 102
 movements of, 103
 small, 99
 Intra-ocular tension, influence of drugs on, 337
 Intraperitoneal ventral hernia at McBurney's point, 66, 70
 Intussusception, differentiation of Henoch's purpura from, 287
 Iris, disappearance of, after injury, 349
 Iritis, etiology of, 335
 Iron citrate in treatment of pernicious anemia, 240
 Irrigation of bowel in pernicious anemia, 239
 in treatment of peritonitis, 83
 Ischiadic hernia, 50
 Islands of Langerhans, relation of, to glycosuria, 293

J

JOINT changes in gout, 322

K

KARELL cure of obesity, 260
 Keratitis, parenchymatous, 333
 treatment of, 333
 phlyctenular, 333
 Kerotomy in suppurating ulcer of cornea, 332
 Krönig's light in hysterectomy for cancer, 167

L

LABOR, permanent incontinence of urine after, 221

Lacrymal obstruction, 347
 Laparotomy on battlefield, 99
 cosmetic effect of, 89
 scars, relation of, to abdominal hernia, 54
 wound, drainage and care of, after peritonitis, 80
 Large intestine, 107
 Leukanemia, 251
 Leukemia, 242
 lymphatic, 252
 mixed, 248
 splenomyelogenous, 248
 treatment of, 252
 bacterial toxins in, 254
 operative measures in, 254
 x-ray, 252

Lid movements, congenital defect of, 346
 ocular, 346
 Ligation of hepatic artery, 130
 Ligature operation for hemorrhoids, 120
 Linea alba, large hernias of, 202
 Lipemia in pancreatic diabetes, 295
 Liver, 129
 hemorrhage from, capillary, serum injections in, 131
 control of, 129
 operations on, technique of, 129
 torn, suture of, 129
 Local disinfection, 196
 Lumbar anesthesia, 55
 Lumbricoid worm in ovarian abscess, 192
 Lymphatic leukemia, 252

M

MANIA in gout, 324
 Martin's operation for umbilical hernia, 41
 Megacolon, 107
 Metabolism in diabetes, 299
 respiratory, in glycosuria, 301
 Metastases of uterine cancer, 153
 Metastasis to lung from pseudomucinous ovarian cyst, 192
 Metastatic gonorrheal conjunctivitis, 330
 Migraine, in gout 324
 Milk, diabetic, 318
 Moebius' sign in exophthalmic goitre, 275
 Mortality after appendectomy, 104
 after operation for peritonitis, 81
 postoperative, reduction of, 77
 Movements of intestines, 103
 ocular, 352
 congenital defects of, 353
 Mumps, optic neuritis following, 344
 Muscles, ocular, lifting power of, 352
 Muscular tremor in exophthalmic goitre, 276
 Myopia, 351
 Myoplasty for inguinal hernia, 40
 Myxedema, 261
 partial, 262
 infantile, 264
 postoperative, 265
 spontaneous adult, 263
 etiology of, 263
 symptoms of, 263
 treatment of, 266

N

- NASAL accessory sinus disease with optic neuritis, 343
 Nausea and vomiting, influence of gall-bladder on postoperative, 213
 Necrosis, pancreatic, 143
 etiology of, 143
 Nervous disorders, pelvic symptoms of, 225
 symptoms of pernicious anemia, 235
 system, changes in, in gout, 324
 Nervousness in exophthalmic goitre, 276
 Neuritis, brachial, in gout, 324
 peripheral, in gout, 324
 peroneal, 214
 retrobulbar optic, 343
 nasal accessory sinus disease with, 343
 prognosis in, 343
 Non-diabetic glycosuria, 300
 Notation of astigmatism, 351
 Nystagmus, 353

O

- OATMEAL cure in diabetes, 315, 317
 Obesity, 258
 alternating electric current in, 260
 Karell cure of, 260
 Rosenfeld-Richter potato diet in, 260
 thyroid treatment of, 259
 Obstruction, intestinal, 215
 Ocular infection by flies, 330
 Ocular movements, 352
 congenital defects of, 353
 muscles, lifting power of, 352
 symptoms of exophthalmic goitre, 275
 Opacities of cornea, 334
 thyroidin in, 340
 vitreous, 340
 Operating room, air of, 194
 simplicity in, advantage of, 106
 Operations, abdominal, how to prevent adhesions after, 209
 undetached pads and sponges in, 197
 Bassini, 52
 for cystocele, new, 206
 early rising after, 214
 for hemorrhoids, 119-123
 for hernia, results of, 64
 on liver, technique of, 129
 for prolapsus uteri, new, 206
 for pruritus ani, 115
 Talma, 87
 technique of, for uterine cancer, 166
 on uterine cervix, local anesthesia for, 196
 Watkins', observation on, 202
 Operative measures in treatment of leukemia, 254
 Ophthalmia neonatorum, 329
 silver salts in, 329
 sympathetic, 336
 Ophthalmology, 327
 Optic nerve, 341

- Optic neuritis retrobulbar, 343
 prognosis in, 343
 with acute disease, 344
 tracts, 341
 Orbital from dental disease, 348
 Ovarian abscess, lumbricoid worm in, 192
 carcinoma, 188
 cyst, pseudomucinous, metastasis of lung from, 192
 tumors, ovariectomy for, end results of, 188
 Ovariectomy for ovarian tumors, end results of, 188
 Ovary, adenocystoma-pseudomucinosum of, 188
 carcinoma of, 188
 conservative surgery of, limitations of, 191
 value of, 191
 dermoid tumors of, 188, 193
 fibroids of, 188
 papillary serous cystoma of, 189
 pseudomyxomata of, 190
 retention cysts of, 188
 sarcoma of, 190
 teratoma of, 190
 "Over-hernia," radical operation of, 42

P

- PADS and sponges, undetached, in abdominal operations, 197
 Pain, rectal, obscure, 111
 Palpitation of heart in exophthalmic goitre, 273
 Pancreas, 143
 glycolytic enzyme in, 303
 pathological anatomy of, in diabetes mellitus, 291
 Pancreatic diabetes, 295
 glycemia in, 302
 lipemia in, 295
 necrosis, 143
 etiology of, 143
 secretion in treatment of diabetes, 319
 Pancreatitis, acute, diagnosis of, 143
 infections, diabetes from, 296
 Pankreatin in treatment of diabetes, 314
 Papillary serous cystoma of ovary, 189
 Paralysis of accommodation following diphtheria, 352
 peroneal, 214
 Parenchymatous keratitis, 333
 Partial myxedema, 262
 infantile, 264
 postoperative, 265
 spontaneous adult, 263
 Pelvic inflammations, time to operate in, 184
 symptoms of nervous disorders, 225
 Perineorrhaphy, submucous, 203
 Pernicious anemia. *See* Anemia.
 Peritoneal adhesions, disappearance of, 88
 meaning of, 212
 Peritonitis, diagnosis of, 82
 etiology of, 82
 mortality after operation for, 81

- Peritonitis, prognosis of, 83
 suppurative, operative treatment of, 79
 treatment of, 78, 82
 adrenalin in, 84
 Fowler-Murphy, 85
 irrigation in, 83
 saline transfusion in, 84
 tamponade in, 83
- Peroneal neuritis, 214
 paralysis, 214
- Phlyctenular keratitis, 333
- Position, improved Trendelenburg, 197
- Postanesthetic acidosis, 307
- Postmortem findings in acidosis, 307
- Postoperative mortality, reduction of, 77
 partial myxedema, 265
 psychoses, 225
- Postural drainage for appendix operations, 200
- Potato diet in obesity, 260
- Pregnancy, effect of, upon tolerance for sugar, 303
 extra-uterine, symptoms of, 186
 glycosuria in, significance of, 309
 influence of exophthalmic goitre upon, 278
- Preretinal hemorrhage, 341
- Primary cancer of Fallopian tube, 187
 tuberculosis of hernial sac, 48
- Proctoclysis, apparatus for, 85
- Proctotomy for foreign body, 125
- Prolapsus uteri, new operation for, 206
- Properitoneal hernia in female, 27
- Protective spectacles, 328
- Pruritus ani, operations for, 115
- Pseudomyxomata of ovary, 190
- Psychoses, postoperative, 225
- Purpura fulminans, 283
 hemorrhagica, 283
 etiology of, 283
 Henoch's, 287
 differentiation of, from intussusception, 287
 with angioneurotic edema, 287

R

- RADICAL operation of "over-herniæ," 42
- Recessus cecalis, hernia of, 59
- Rectal pain, obscure, 111
 shelf, 111
 stenosis, 123
 surgery, anesthetics for, 112
- Rectum, 107
 cancer of, 125
 amputation of rectum in, 126
- Refraction, 351
- Resection of excessive fat from abdominal wall, 202
- Respiratory metabolism in glycosuria, 301
- Retention cysts of ovary, 188
- Retina, 341
- Retinal hemorrhage, 341
 in pernicious anemia, 237
- Retinitis, chronic, with massive exudation, 342

- Retroperitoneal hernia of intersigmoid fossa, 66
- Röntgen rays in exophthalmic goitre, 280
- Rosenbach's sign of exophthalmic goitre, 275
- Rosenfeld-Richter potato diet in obesity, 260

S

- SALINE transfusion in peritonitis, 84
- Sarcoma of ovary, 190
- Sciatica in gout, 324
- Scurvy, infantile, 281
 diagnosis of, 283
 etiology of, 281
 prognosis of, 283
 symptoms of, 282
 treatment of, 283
- Secondary cancer of uterus, 156
- Senility, premature, in gout, 324
- Sensation in abdominal cavity, 73
- Serum injections to prevent capillary hemorrhage of liver, 131
 therapy in exophthalmic goitre, 278
 in suppurating ulcer of cornea, 332
 treatment of hemophilia, 290
- Sigmoid, carcinoma of, 110
 diverticulitis of, 110
- Silver salts in ophthalmia neonatorum, 329
- Simplicity in operating, advantage of, 106
- Skin changes in gout, 324
 pigmentation of, in pernicious anemia, 235
- Small intestine, 99
- Sodium chloride glycosuria, 303
- Sophol in ophthalmia neonatorum, 329
- Sour milk in exophthalmic goitre, 281
- Spectacles, protective, 328
- Specula, new, rectal, 114
- Sphincter ani, operation for reconstruction of, 128
- Spleen, 145
 enlargement of, in pernicious anemia, 235
 torsion of, 145
- Splenomyelogenous leukemia, 248
- Sponges, undetached pads and, in abdominal operations, 197
- Spontaneous adult partial myxedema, 263
- Sporotrichosis, 346
- Static disorders, backache from, 222
- Stellwag's sign of exophthalmic goitre, 275
- Stenosis, rectal, 123
- Sterility, dysmenorrhea and, 182
- Stomach, 90
 dilatation of, and acute intestinal obstruction, 90
 acute, postoperative, 218
- Strangulated gall-bladder, 136
 hernia, intestinal resection in, 19
- Strangulation, intestinal, without obstruction, 103
- Subconjunctivitis, epibulbar, 330
- Subhyaloid hemorrhage, 341
- Submucous perineorrhaphy, 203

Subphrenic abscess, 86
 Sugar, effect of pregnancy upon tolerance for, 303
 Suker's sign of exophthalmic goitre, 275
 Suppurative peritonitis, operative treatment of, 79
 Surgery of abdomen, 73
 Sutures, intestinal, influence of opium and physostigmine upon, 89
 of torn liver, 129
 Sympathetic ophthalmia, 336
 Syphilis, inherited, oval cornea of, 334

T

TALMA operation, 87
 Technique, new, of vaginal hysterectomy, 201
 Teratoma of ovary, 190
 Test diet, Falta's, in diabetes, 314
 Testicle, undescended, operative treatment of, 56
 Tests for acidosis, 305
 Throat changes in gout, 325
 Thymus gland, extract of, in exophthalmic goitre, 279
 Thyroid gland in exophthalmic goitre, 274
 influence of, upon carbohydrate destruction, 299
 relation of, to glycosuria, 298
 treatment of obesity, 259
 Thyroidectomy in alimentary glycosuria, 298
 Thyroidin in vitreous opacities, 340
 Time to operate in pelvic inflammations, 184
 Torsion of gall-bladder, gangrene following, 138
 of spleen, 145
 Toxicity of glucose, 302
 Transfusion in pernicious anemia, 239
 Traumatic dislocation of eyeball, 350
 hernia, 17
 Treatment of acute pancreatitis, 145
 of Addison's disease, 258
 of carcinoma, medical, 173
 of cretinism, 266
 of diabetes, 311
 effect of, upon prognosis, 319
 of epigastric hernia, 47
 of gout, 325
 of hemophilia, 290
 serum in, 290
 of infantile scurvy, 283
 of inguinal hernia in children, operative, 52
 in female, 31
 of leukemia, 252
 bacterial toxins in, 254
 operative measures in, 254
 x-ray, 252
 of myxedema, 266
 of obesity, thyroid, 259
 alternating electric current in, 260
 Karell cure in, 260
 potato diet in, 260
 of parenchymatous keratitis, 333

Treatment of peritonitis, 78
 of pernicious anemia, 239
 of retrodisplacement of uterus, 176
 of suppurating ulcer of cornea, 332
 of undescended testicle, operative, 56
 Trendelenburg position, improved, 197
 Tremor, muscular, in exophthalmic goitre, 276
 Tuberculin in uveal tuberculosis, 336
 Tuberculosis of hernial sac, primary, 48
 etiology of, 49
 prognosis of, 50
 symptoms of, 49

uveal, 335

 prognosis of, 336
 tuberculin in, 336
 with chronic choroiditis, 336
 Tumor of tunica vaginalis, 51
 Tunica vaginalis, tumor of, 51
 Typhoid fever, optic neuritis following, 344

U

ULCER of cornea, serpent, 331
 suppurating, 331
 treatment of, 332
 kerotomy in, 332
 serum therapy in, 332
 duodenal, 96
 gastric, perforated, 96
 relationship of, and gastric carcinoma, 97
 Umbilical hernia, etiology of, 34
 Martin's operation for, 41
 operations for, 36, 37
 pathology of, 34
 Urinary excretion during anesthesia, 193
 Urine, incontinence of, permanent, after labor, 221
 Uterus, cancer of, 147
 acetone treatment of, 174
 cystoscopy in, 162
 early diagnosis of, 157
 education about, 160
 metastases of, 153
 to adrenals, 155
 to bones, 154
 symptoms of, 154
 to kidneys, 156
 to liver, 155
 to lungs, 156
 to pancreas, 155
 to peritoneum, 154
 to pleura, 156
 to skin, 156
 to spleen, 154
 to thyroid gland, 155
 operability of, 162
 operation for, choosing type of, 167
 technique of, 166
 prevalence of, 157
 results of operations for, 169
 secondary, 156
 technique of operations for, 166
 retrodisplacement of, treatment of, 176

Uveal tract, 335
tuberculosis, 335

V

VAGINAL hysterectomy, new technique of,
201

Vernon's operation for hemorrhoids, 120

Vesicovaginal fistula after operation for
uterine cancer, 172

Visceral adhesions, symptoms from, 207

Visual acuity, international standard, of
327

Vitreous, 338

hemorrhage, 340

opacities, 340

Vomiting, postoperative, influence of gall-
bladder on, 213

Von Graefe's sign in exophthalmic goitre,
275

W

WANDERING gall-bladder, 136, 138

Watkins' operation, observation on, 202

Whitehead operation for hemorrhoids, 120

X

X-RAY in exophthalmic goitre, 280

treatment of leukemia, 252

University of Toronto

Biological Library
& Medical
Serials _____

**DO NOT
REMOVE
THE
CARD
FROM
THIS
POCKET**

Acme Library Card Pocket
Under Pat. "Ref. Index File"
Made by LIBRARY BUREAU

